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Understanding health care utilization of older adults with Parkinson's disease in Taiwan

- Role of psychological variables

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ABSTRACT

Aims: As a common neurodegenerative chronic illness in old age, Parkinson's disease (PD) is a leading reason of long-term health care utilization. While the multifaceted economic concerns in this disorder are internationally well documented, the psychological aspects have not received the same attention. The present study, based on a modified Andersen model, aimed at improving the understanding of predictors addressing health care utilization among a sample of older Taiwanese adults with PD, specifically exploring the role of the psychological component and investigating the relationships between depressive symptoms, health care utilization and health-related quality of life (HRQOL). The specific goals of the present research project were to (1) get an insight into the characteristics of health care utilization in PD; (2) test a modified Andersen model with additional psychological variables such as knowledge, attitudes, the social norms and perceived control; (3) establish path models predicting differentiated types of health care utilization examined in this study; and to (4) explore the relationships between health care utilization, depressive symptoms and HRQOL among a sample of older Taiwanese adults with PD.

Methods: This study was conducted in Taipei, Taiwan, in 2009, using a cross-sectional design and a questionnaire orally administered to 284 persons with PD aged 65 and over, who had been recruited via location sampling in four outpatient clinic settings. A final useable response rate of 70.4 per cent was achieved, which included a sample of 200 participants, consisting of 104 males (52%) and 96 females (48%). Statistical description and logistic regression analysis in SPSS Version 16 and path analysis in LISREL Version 8.72 were conducted for the data analysis.

Results: Visits to hospital out-patient departments were found to be the most utilized

health care service (approximately 70%), followed by prescription refill slips (52.5%), supportive devices (55.5%) and family care (48%). According to logistic regression analysis, the modified Andersen model showed a good fit with the data and accounted for between 23.6% and 53.4% of the variance (Negelkerke R^2). Need was indicated to be the most significant risk factor. It is to be noted that risk factors concerning the utilization of single service were suggested to vary from service to service, depending on the service being measured. Moreover, based on an 'aggregate' approach (single services had been aggregated into four types of services), path analysis revealed significant effects of need, followed by the psychological and predisposing components. Addressing the utilization of medical and care services, the role of psychological variables turned out to be significant. In detail, ADL, attitudes towards health care and age were indicated to have total effects on the utilization of medical services; ADL, age, education level, selective and compensatory control were significantly linked to the utilization of care services.

In regards with HRQOL among older adults with PD, the findings indicated that selective control and ADL had positive total effects on HRQOL, whereas co-morbidity, age and education level were negatively linked to HRQOL. Additionally, the utilization of care services was proved to have negative total effects on HRQOL. Moreover, once depressive symptoms were taken into consideration, depressive symptoms, age, co-morbidity, education level, ADL and selective control were suggested to be significantly linked to HRQOL. Particularly, high levels of depressive symptoms were more likely to be associated with an increasing utilization of medical and care services. Additionally, the utilization of care services was proved to have negative total effects on HRQOL. Indirect effects on HRQOL and a complex interplay inherent in the modified behavioral model were also identified.

Conclusion: Next to need, the psychological variables in the modified Andersen model were proved to have total effects on health care utilization. Health care services were recommended to be categorized into different types with the aim of extending the understanding of multifaceted health care utilization and HRQOL in PD. Moreover, the impacts of selective control, depressive symptoms and the utilization of care services on HRQOL were identified. Accordingly, screening and treatment for depression and implementing behavioral intervention programs with the concept of perceived control were likely to improve HRQOL among the older adults with PD.

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LIST OF ABBREVIATIONS

ADL	Activity of Daily Living
CAM	Complementary and Alternative Medicine
CIPRS	Chronic Illness Prescription Refill Slip
ER	Emergency Room
GDS-15, GDS-SF	Geriatric Depression Scale short form
HECS	Health Engagement Control Strategy
HRQOL	Health Related Quality of Life
HY Stage	Hoehn and Yahr Stage
IADL	Instrumental Activity of Daily Living
NHI	National Health Insurance
NTD	New Taiwan Dollar
OPD	Outpatient Department
PD	Parkinson's Disease
PDQ	Parkinson's Disease Questionnaire
QOL	Quality of Life
REHAB	Rehabilitation
RMSEA	Root Mean Square Error of Approximation
SF-36/SF-12	Health Survey long form / Health Survey short form
USD	United States Dollar
VIF	Variance Inflating Factor

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CHAPTER ONE

INTRODUCTION

This cross-sectional study aims at extending the Andersen model by considering the role of psychological variables in the prediction of health care utilization and at exploring relationships between health care utilization and the health-related quality of life (HRQOL) among a sample of older Taiwanese adults with Parkinson's disease.

1.1 BACKGROUND TO THE STUDY

Parkinson's disease is the second most common neurodegenerative disease that belongs to a group of conditions called movement disorders. Its prevalence is increasing so dramatically that the number of patients over the age of 50 with PD in the world's 15 most populous nations will grow substantially in the next 25 years, from 4.6 million in 2005 to 9.3 million by 2030 (Dorsey et al., 2007). One of the inevitable consequences of the growing prevalence of PD is a socioeconomic burden (Noyes et al., 2006).

Furthermore, due to the characteristics of this chronic illness, impacts on motor, non-motor functions (including cognitive impairment, communication problems, depression and further more), activities of daily living and quality of life will increase with disease progression (Behari, Srivastava, & Pandey, 2005; Costa et al., 2008; Samii, Nutt, & Ransom, 2004; Roh et al., 2009). The long disease duration and the high prevalence of dementia in later stages (Hely et al., 2008; Murray et al., 2004) often result in different levels of disability, high medical needs and immense health care utilization (Chen & Tsaia, 2010; Dowding, Shenton, & Salek, 2006; Noyes et al., 2006).

There is no doubt that neurodegenerative chronic illness such as PD will bring an ageing/aged society an enormous health care burden and challenges for the entire health

care delivery system in the near future (Findley et al., 2003; Findley, 2007; Kane, Priester, & Totten, 2005).

However, health care utilization among older adults with PD in Taiwan has not been well documented. Most previous studies had viewed this issue from a public health perspective (Wu, 2005), namely from a provider view-point and failed to examine it from a patient's perspective, let alone to explore the role of psychological variables. The present study, intending to fill this empirical gap, aims at discussing ways in which psychological characteristics can be integrated into the model of health care utilization, by examining firstly health care utilization first of all, and then by exploring the relationships between health care utilization and HRQOL among the target group.

1.2 OBJECTIVES OF THE STUDY

The overall objective of this study is to test the potential of a modified Andersen model of health care utilization with psychological variables, to gain an insight into health care utilization of older adults aged 65 years and over with PD in Taiwan. Central to the overall purpose there are four research objectives as follows.

- to examine characteristics of health care utilization among older Taiwanese adults with PD;
- to test a modified Andersen model with integration of psychological variables;
- to get a complex understanding of relationships between key variables by conducting path analyses and to examine the total , direct and indirect effects of the model components;

- to additionally extend the framework to include HRQOL as an outcome relating to health and to explore this psychological construct in relation to health care utilization and depressive symptoms.

1.3 STRUCTURE OF THIS THESIS

This thesis consists of the following five chapters:

Chapter One - Introduction: This chapter provides background information in relation to health care utilization in PD and an overview of the study's aim and objectives.

Chapter Two - Literature review and conceptual foundation: This chapter provides a comprehensive review of literature related to the aims and objectives of this thesis, particularly diverse models of health care utilization and their key variables. Also included in this chapter is a review of psychological control and HRQOL illustrating relationships with the objectives and the psychological variables examined. The research questions and two theoretical frameworks are presented.

Chapter Three - Study Methods: This chapter describes the study design, research procedure, the questionnaire and methods of statistic analysis used for the present study.

Chapter Four - Results: The principal findings relevant to how older adults with PD in Taiwan utilize each service examined, medical services, care services, CAM and overall health care utilization are presented. Also included in this chapter are the results demonstrating the relationships between population characteristics, health care utilization, depressive symptoms and HRQOL.

Chapter Five - Discussion and Conclusions: This chapter concludes this thesis with a summary of the main outcomes and the strengths and limitations, with discussions and recommendations for clinical practice and further research.

CHAPTER TWO

LITERATURE REVIEW AND CONCEPTUAL FOUNDATION

2.1 INTRODUCTION

The following sections will present a description of health care in Taiwan, review operational definitions and key variables. International studies addressing health care services and their utilization in PD will be reviewed in detail, as well as the well-known Andersen model with its revisions and sources of psychological variables examined in this study.

Recently, HRQOL and depression have become main streams of health research. How is HRQOL related to the context of health care utilization? Is there any evidence indicating the impact of depressive symptoms on the use of health care services and HRQOL? The last section of this chapter will review the topic of HRQOL in relation to PD.

2.2 HEALTH CARE IN TAIWAN

Firstly, an overview of the population profile of Taiwan, emphasizing national health characteristics should be helpful for the current study to approach the research topic. This is presented as follows.

2.2.1 Health Care System

In 2010, the population of Taiwan was 23.145 million, with a gross national product (GNP) of USD 416,221 billion and a GNP of USD 18,565 (Taiwan DGBAS, 2010a). The Executive Yuan Department of Health (DOH) is the highest authority on health in Taiwan, which is responsible for the administration, guidance, supervision and

coordination of health services at all levels.

On the level of health services providers, 20,174 medical facilities were registered at the end of 2009, including 515 hospitals, 10,326 western medicine clinics, 3,160 Chinese medicine clinics and 6,173 dental clinics. The available data indicated that there were 97.1 medical personnel per 10,000 population, including 16.1 western physicians, 2.2 physicians of Chinese medicine, 4.8 dentists, 12.5 pharmacists, 51.7 nurses and 5.8 others (Taiwan DOH, 2010a).

In addition, issues addressing health expenditure reported that approximately 58% of national health expenditure (NHE) was used for personal medical care for citizens aged over 50. In 2010, for example, the expenses for those aged 60-69 amounted to an average of NTD 85,735, for those aged 70-79 up to NTD 116,924 (approximately USD 3,772), declining to NTD 87,953 (approximately USD 2,837) for the age group 80-89 (Taiwan DOH, 2010b).

2.2.2 National Health Insurance

A National Health Insurance (NHI) program was launched in 1995, in view of growing medical care costs and enormous demographical changes. Over 23 million people were enrolled in the program in July 2010, representing 99.3% of the total population (Taiwan Bureau NHI, 2010). The Bureau of NHI has signed contracts with 91% of the medical institutes nationwide to provide medical services to the insured. Due to the high rate of consultations, the NHI premium rate was raised in 2002 from 4.25% to 4.55% of the insured's income.

Further, the amount of NHI premium exempted in 2006 reached NTD 2.9 billion. Although the number of elderly beneficiaries comprised about 10% of the entire insured

population, the medical costs expensed for this age group amounted to 33% of the total medical expenses (Taiwan DOH, 2008). These facts indicate that older adults use disproportionately more health services than other age groups do. In other words, health care utilization among Taiwanese is for old age.

2.2.3 Epidemiological and Demographic Characteristics of Older Taiwanese Adults

2.2.3.1 General Status

Since 1993, Taiwan has been what the World Health Organization (WHO) classifies as an aged society. The percentage of people aged 65 and over in the Taiwanese population increased from 2.5% in 1951 to 10.71% in August 2010 (Taiwan Department of Statistic MOI, 2010b).

In August 2010, Taiwan had a population of 23.145 million, the elderly population had reached 2,312,359; among them 1,135,176 were male, 1,177,183 female (Taiwan MOI, 2008). The proportion was projected to be 25.4% in 2031 and 34.6% in 2047 (Taiwan DGBAS, 2010b).

Of the elderly, those aged 85 and over are the fastest growing population in the Taiwanese society (Taiwan Department of Statistics MOI, 2008). Further to this, the rate of increase in the elderly population is faster than in western countries. Taiwan's index of aging increased between 1997 and 2008 from 35.70% to 61.50% (1.72 times), whereas the index of aging in Germany, for example, increased in the same period of time from 98.30% to 150.2% (1.42 times) (Taiwan Department of Statistic MOI, 2010a).

Due to the health improvement among the general population over the last few decades, life expectancy increased between 1957 and 2008 from 59.73 years to 74.86

years for males, and from 63.25 years to 81.41 years for females (Taiwan Department of Statistics MOI, 2008).

2.2.3.2 Demographic Characteristics

According to the national *'Survey of Senior Citizens Condition in Taiwan-Fuchien Area'* (2005), the average education in years among 73.85% of the elderly population was 6 or less. Approximately 60% were married (57.53%), while 40.96% were widows or widowers. In 1990, 62.35% of the elderly lived with their children. By 2005, this figure had decreased to 60.36%; among them 37.87% lived in a three-generation household and 22.49% in a two-generation household. 22.20% of the elderly population lived only with their spouse, 13.66% lived alone (Taiwan Department of Statistics MOI, 2005).

Furthermore, in respect of the self-evaluated health status, one third (32.95%) considered their health conditions as good, 22.10% poor. 73.06% visited the doctor regularly when ill; 16.24% of them did not visit the doctor regularly (Taiwan Department of Statistics MOI, 2005).

Approximately two thirds (65.02%) of the elderly had chronic diseases. 65.38% visited the doctor in the previous month; the average number of consultations in the last month was 2.25. The average time of hospitalization was 1.85 and the average number of days of hospitalization was 17.83. While hospitalized, 21.10% of the elderly were taken care of by a son (Taiwan Department of Statistics MOI, 2005).

It is necessary to mention that it is traditional in the Taiwanese society for married adult children to financially support their elderly parents. For example, the survey above pointed out that 51.72% of the elderly derived their main income source from offspring.

22.58% from government source or allowance and 17.35% relied on their retirement funds, pension or insurance. The average total monthly living allowance for the elderly was around NTD 11,715 (approximately USD 378) (Taiwan Department of Statistics MOI, 2005).

2.2.4 Summary

This chapter has presented background information, the current health care situation and the relevant demographic data of the older adults in Taiwan. Three issues above were emphasized.

First, studies indicated that older adults in Taiwan use disproportionately more health services and have higher medical care expenditure than other age groups do. Second, the availability of health services in Taiwan is ensured since the implementation of NHI insurance program. And finally, in spite of the changing trends of living arrangements in Taiwan, familiar or kinship support is preferred in old age.

Based on the evidence above, the present study suggests considering age as a potential predictor of health care utilization, discussing health care utilization on the system level and providing an insight into psychological aspects of health care utilization.

2.3 HEALTH CARE UTILIZATION IN PARKINSON'S DISEASE

2.3.1 Parkinson's Disease

2.3.1.1 Medical Overview

Parkinson's disease ('idiopathic Parkinson's disease') is named after the British physician Dr. James Parkinson, who described this illness in his essay in 1817 «*An Essay on the Shaking Palsy*» (Parkinson, 2002). As a chronic and progressive

neurodegenerative movement disorder, it affects all ethnic groups and socioeconomic classes worldwide (WHO, 2007).

Traditionally, PD has been considered as a disease resulting from loss of dopaminergic neurons in the substantia nigra. However recent evidences demonstrated that variable pathologic substrates can result in the clinical syndrome of PD (Wszolek et al., 2004) and that the clinical syndrome for degeneration of the substantia nigra is not constant (Lewis et al., 2005).

From the clinical perspective, PD refers to "*an adult-onset progressive disorder dominated by Parkinson's disease responsive to levedopa and commonly for motor complications*" (Marras & Lang, 2008), such as tremor, rigidity, bradykinesia (a slowing of physical movement) and postural instability (Cubo et al., 2003; Hoehn & Yahr, 1967; Weintraub, Comella, & Horn, 2008a).

The crude prevalence rate of PD has been reported to range from 15 per 100,000 population to 12,500 per 100,000 population, and the incidence of PD from 15 per 100,000 population to 328 per 100,000 population (Chen & Tsaia, 2010). The European age-adjusted prevalence is estimated at 160 per 100,000 population (de Rijk et al., 1997). Similar estimates have been recently reported for the United States, China and several Asian countries (Bower et al., 2000; Chen et al., 2001; Zhang et al., 2003; Zhang et al., 2005).

The prevalence of PD increases steeply with age (Young & Justice, 2000), which is estimated to affect 3.6% of persons aged 80 years and older (de Rijk et al., 1997). Furthermore, researchers predicted a large expansion of the number of patients over 50 in the world's 15 most populous nations, for example from 4.6 million in 2005 to 9.3

million by 2030 (Dorsey et al., 2007).

The precise prevalence and incidence of PD in Taiwan is not clearly known. According to the available information, the age-adjusted prevalence rate of PD in Taiwan for all age groups was 130.1 per 100,000 population after being adjusted to the 1970 US census (Chen et al., 2001). In other words, the estimated number of Taiwanese patients with PD was approximately 30,000. However, some neurologists suggested that this number has exceeded 300,000 (Chen & Tsai, 2010).

Next to the main symptoms, patients experience a wide range of other motor symptoms, such as gait and posture disturbances, speech and swallowing disturbances, balance problems, fatigue, masked faces, micrographia (small and cramped handwriting), impaired fine/gross motor coordination and further more (Cubo et al., 2003; Young & Justice, 2000).

Individuals with PD also suffer from non-motor symptoms. Mental dysfunction (mood, cognition, psychological distress) is reported. Cognitive deficits (Athey & Walker, 2006; Foltynie et al., 2004), specific learning impairment (Ashby et al., 2003), memory impairment (Gilbert et al., 2005) and a high prevalence of dementia can also be found in the late disease stage (Buchanan et al., 2002; Hely et al., 2008; Kurz et al., 2006).

Depression is another common symptom related to disease severity and duration (Allott et al., 2005; Greene & Camicioli, 2007). PD even impacts social functioning and communication (Chaudhuri, Yates, & Martinez-Martin, 2005; Den Oudsten, Van Heck, & Vries, 2007).

Beside mood and cognitive disturbances, patients with PD may also have problems

with sleep, sensation and their autonomic nerve system (Visser et al., 2008). It is worth mentioning that symptoms of PD are significantly hetrogen. Clinical experience reveals that every patient's symptoms may be quite different and the disease proceeds also distinctly individually (Weintraub, Comella, & Horn, 2008a).

In addition, PD has a disease duration average of approximately 15 years (Murray et al., 2004). The medical intervention and care need of patients with PD is of increasing concern (Goy, Carter, & Ganzini, 2008; Thomas, 2006).

2.3.1.2 Diagnosis and Treatment

To date, there is no definitive diagnostic test for PD. In other words, this degenerative illness cannot be diagnosed accurately, can be easily missed or misdiagnosed (Pallone, 2007). The clinical diagnosis is predominantly based on ICD-9-CM 332.0, medical history and a neurological examination.

Clinical instruments such as the *Hoehn and Yahr Scale* (Hoehn & Yahr, 1967) and the *Unified Parkinson's Disease Rating Scale* (*UPDRS*) (Martínez-Martín et al., 1994; Martinez-Martin, Prieto, & Forjaz, 2006) are used to assist in diagnosis and determine the severity and degree of disability in patients with PD. According to the first scale, the progression is divided into 5 stages. Hoehn and Yahr stage (HY stage) 3, for example, is identified as the point at which the disease becomes disabling (Hoehn & Yahr, 1967). In addition, UPDRS focuses on examining mental status, ADL, motor function and complications of therapy (Martinez-Martin, Prieto, & Forjaz, 2006).

In respect of treatment, there is currently no known cure. Drug therapies are the most well-established medical intervention, aiming at relieving symptoms and preserving the patients' quality of life (QOL) by maintaining abilities of daily living and

independence, however pharmacotherapy are strictly palliative (Dodel, Berger, & Oertel, 2001; Rezak, 2007).

Surgical approaches, such as deep brain stimulation of the subthalamic nucleus (DBS-STN), pallidotomy or thermocoagulation, can improve tremor and rigidity significantly (Drapier et al., 2005; Just & Ostergaard, 2002). The long-term effects of these procedures are still being explored (Castelli et al., 2004; Kuehler et al., 2003; Pereira & Aziz, 2006). However, surgery appears to be not only expensive and risky, but also reserved as an option for patients in good health, but with unsatisfied response to drug therapies (Weintraub, Comella, & Horn, 2008b).

2.3.1.3 Summary

Though PD may affect individuals aged 55 or less (Samii, Nutt, & Ransom, 2004), studies reported a prevalence rate that increases with age. In this case, issues addressing older adults with this neurological degenerative illness are certainly gaining greater importance in the field of medicine and social science research.

Furthermore, the dramatically growing patient numbers with PD, its degenerative and chronic nature, the complexity of motor and non-motor symptoms, the long survival time, possible intervention by surgery or with drugs and the demanding medical needs were described in the last two sections above. The high prevalence rate of depression among individuals with PD will be taken into consideration in exploring the issue of HRQOL in the current study.

2.3.2 Overview of Health Care Utilization

2.3.2.1 Understanding Health Care Utilization

The conceptual definition of the term '*health care utilization*' or '*health services utilization*' has been extensive and varied. In general, health care utilization can be examined from the provider/patient or from an economic or even from a service perspective.

For instance, economic health studies answer questions such as: "*How many resources are used or lost due to some particular illness in society*?" (Martin et al., 2012) and place emphasis basically on the economic burden or cost of illness, on issues concerning cost-effectiveness and healthcare financing. Such studies argue that health care utilization includes direct and indirect costs. Direct costs are the health system costs attributed to treatment, medications, co-payments, laboratory tests and operational expenses, while indirect costs consist of productivity loss relating to the disease (Martin et al., 2012; Winter et al., 2010a).

Based on the discussion above, health care utilization will subsequently be measured as the type, incidence/amount/volume (hours, days, times) (Nordberg et al., 2005; Spottke et al., 2002) of use of health care services, including drug prescription (Liu & Romeis, 2004). Relevant data can be collected from governmental medical economic databases, medical records and/or the self-reported access to health care services (Hagell et al.,2002; Spottke et al., 2005).

Parallel to the economic concerns, health care utilization can be assessed from a patient's perspective and defined by the way in which individuals respond to ill health and disease. The health research categorizes responses closely linked to people's use of health services into three types: '*preventive health care behavior*', '*illness behavior*' and '*sick-role behavior*' (Glanz, Rimer, & Lewis, 2002; Rosenstock, 1966). Particularly, the '*illness behavior*' is described as *"an activity undertaken by a person who feels ill, for*

the purpose of defining the state of his health and of discovering a suitable remedy" (Glanz, Rimer, & Lewis, 2002). This definition can be further embedded into a broader context, since studies in the field of health psychology have proved that health behaviours are associated with

> "*personal attributes such as beliefs, expectations, motives, values, perceptions and other cognitive elements; personality characteristics, including effective and emotional states and traits; and overt behaviour patterns, actions and habits that relate to health maintenance, to health restoration and to health improvement.*" (Gochman, 1997, p. 3)

According to the previous definition, health care utilization is not only observable in actions, but also by emotional states and cognitive processes. To conclude, health care utilization can be defined as an '*illness behavior*' associated with its psychological correlates such as knowledge and belief. This definition will be adopted for the present study exploring health care utilization from the psychological perspective of individuals suffering from a chronic disease.

As mentioned above, health care utilization can be explored as tasks performed by organisations or individuals that are received by individuals for their illness sake. These tasks include medical services, community and home-based services and informal social support. For instance, Broe et al. (2002) defined health care services as follows.

(1) Medical services are divided into three measures, namely: days in hospital, specialist visits and ambulatory care visits;

(2) community- and home-based services include ADL community services (for example, home nursing and bathing), IADL community services (for example, meals on wheels, general home help, laundry, home maintenance and shopping);

(3) mobility services (transport services); and

(4) allied health services including physiotherapy, speech therapy, social work-welfare and so on.

Based on a similar conception of health care services, an EU-funded project *'Old Age and Autonomy: The Role of Services Systems and Intergenerational Solidarity'* (OASIS) (Lowenstein & Ogg, 2003) operated health care utilization as below:

(1) Help with household chores (yes-or-no question);

(2) help with transport or shopping (yes-or-no question);

(3) help with personal care (yes-or-no question);

(4) use of other services (including home help, home care, home nursing, alarm and emergency aid call systems, day care centre, pensioners club, meals-on-wheels and transport service) (a score of total used services was calculated).

At this point, it is necessary to note that studies initiating from the provider side focus often on issues such as accessibility, availability, affordability, allocation, quality of health care services, health outcomes as well as on the satisfaction.

Given that the current thesis is interested not only in the utilization of single health care services, but also in the whole spectrum of utilization, it has been decided to define health services as Broe et al. (2002) postulated. However due to the low utilization rate in Taiwan (Taiwan Department of Statistics MOI, 2005), mobility services were

excluded. To sum up, four types of health care utilization are defined in the current thesis as follows.

(1) Utilization of medical services: aggregate utilization of out-patient services, emergency room visits, hospitalization, services, rehabilitation services and the chronic illness prescription refill slips;

(2) utilization of complementary and alternative medicine (CAM): aggregate utilization of alternative therapies, supportive devices and supplemental health food;

(3) utilization of care services: aggregate utilization of family care, care services given by foreign domestic workers and social care services;

(4) overall health care utilization: utilization of the aforementioned three types of health care services.

2.3.2.2 Reviewing Key Variables of Health Care Utilization

Based on the previous discussion, this section reviews studies investigating key variables relating to health care utilization.

Generally, there is a large body of evidence demonstrating that diseases and/or disabilities are the significant predictors of health care utilization among older adults (Alkema, Reyes, & Wilber, 2006; Smith, 2003; Wolinsky & Johnson, 1991). Specific chronic diseases with long-term impacts on disability - PD is certainly one of them - are for rising health care utilization (Guilcher et al., 2010; Manocchia, Keller, & Ware, 2001; Siu & Chui, 2004). *The Sydney Older Persons Study* also identified neurodegenerative diseases as an important predictor of receiving community-based services (Waite et al., 2001).

In addition, socio-demographic characteristics such as age, gender, education and living situation were proved to predict health care utilization in old age (Lyons & Chamberlain, 2006; Yount, Agree, & Rebellon, 2004).

Specifically, according to a Canada/US Survey of Health recently, the utilization of hospitalization services was predicted by individual's predisposing characteristics (e.g., age and gender), the need for health care, and particularly by the insurance coverage status of the US citizens, while socioeconomic status was found to be without any significant predictive power (Blackwell et al., 2009).

Furthermore, social support (Gunzelmann, 1999; Hessel et al., 2000; Lai & Kalyniak, 2005; Roberts, Lepore, & Helgeson, 2006; Thombs, 2008) and control belief have proved to be effective predictors of health care utilization in old age. Less accessible social support is for use of formal home care (Paddock & Hirdes, 2003). Perceived control – a classic psychological variable – and its impacts on adaptation, coping with disease, depression and life satisfaction were empirically well-proved (Tromp et al., 2005; Wahl et al., 2004; Windsor et al., 2007). Individuals with less control perception were indicated subsequently to use more health services than their high-control counterparts (Chipperfield & Greenslade, 1999; Chipperfield & Perry, 2006).

As discussed above, key variables of health care utilization in old age refer predominantly to disease-level, individual-level and interpersonal-level factors (Glanz, Rimer, & Lewis, 2002). It is obvious that disease-level factors are mostly regarded as the key factors of health care utilization, whereas influences of environmental and system-level factors are still far from clear.

In order to illustrate the complexity and relationship of the various levels of impact factors which are linked significantly to health care utilization, some widely used models will be reviewed in *Section 2.4* below.

2.3.3 Health Care Utilization in Parkinson's Disease

Specifically referring to PD, studies performed during the two recent decades mostly focused on a number of important aspects that affect the HRQOL (Carod-Artal, Vargas, & Martinez-Martin, 2007; Carod-Artal et al., 2008; Dowding, Shenton, & Salek, 2006). Other studies aimed to investigate patterns and predictors of resource use that influence health care utilization behavior in patients with PD (Hagell et al., 2002). Some studies indicated the unmet needs of patients with PD, specially the lack of enough information from general practitioners (Buetow et al., 2008).

In the following section, international studies related to health care utilization in various settings of patients with PD are discussed. This section also considers and reviews variables that are related to this topic.

2.3.3.1 Reviewing International Empirical Studies

A comprehensive literature review of international studies has been conducted for relevant published papers on specific topics as discussed in this section. Findings are summarized in Table 1[1] with 4 specific sub-topics: health care utilization in PD by cost, frequency, service type and determinants. Relevant studies are discussed below.

(1) Health care utilization by cost

As mentioned previously, with the ageing of global populations and the

[1] The tables and figures are to be found at the end of the chapters from page 171. Click the blue lebeled number to view. After reviewing, scroll back by clicking the number of the table/figure.

epidemiological transition to chronic diseases late in life, research interests have been partially directed toward evaluations of health economic impacts of PD (Noyes et al., 2006).

In the late 90s of the last century, the mean total annual cost of PD in Germany was reported as USD 3,390, linked to disease severity (Dodel et al., 1998). A French study found Parkinsonian patients treated by neurologists had higher expenditures (USD 2,993) than those treated by general practitioners (USD 357). The most expensive component of health care was hospital stays (39% of costs), followed by ancillary care (30%) and drug treatment (22%) (LePen et al., 1999).

Recently, international studies addressing this issue reported that the mean total annual cost per patient for PD was USD 48,427 in the United States (Huse et al., 2005), €20,095 in Germany (Winter, Balzer-Geldsetzer et al., 2010a), £5,993 in the UK (Findley, 2007), USD 12,400 in Sweden (Hagell et al., 2002), USD 6,241 in Australia (Cordato et al., 2006), USD 10,129 in Singapore (Zhao et al., 2011) and USD 925 in China (Wang et al., 2006).

In conclusion, PD poses a major financial burden not only on patients and their families, but also on the health care system and society as the age distribution shifts to older age groups. Furthermore, disease severity is associated significantly with health care utilization and consequently expenditures.

(2) Health care utilization by frequency

An Italy study found 70.8% of the participants with PD used medical health care resources in the year before. They contacted general physicians most of all. Major reasons for hospital admissions were injuries and muscular-skeletal diseases (Cosentino

et al., 2005). Furthermore, services provided by neurologists, physiotherapists, occupational therapists and ergo-therapists were needed as well (Moorer, Suurmeijer, & Zwanikken, 2000). The contact frequency increased with disease severity.

In conclusion, with progression of the disease patients have an increasing need of health care services.

(3) Health care utilization by service type

Relevant literature (see Table 1) revealed growing concerns of allied health care and complementary therapies (Nijkrake et al., 2007). Recently, services such as PD nurse specialists (Hurwitz et al., 2005), patient education programs (Macht et al., 2007; Shimbo et al., 2004; Sunvisson et al., 2001) and music therapy (Pacchetti et al., 2000) have been expanded, in order to enhance patients' sense of wellbeing and to reduce disease-related psychosocial problems.

Because of worsening mobility and less activity in daily life, patients with PD are found to use outpatient and nursing home services more often than persons without this chronic illness (Parashos et al., 2002). In addition, rehabilitation (Wade et al., 2003), fitness programs (Kluding & Quinn McGinnis, 2006), home physiotherapy and music therapy are proved to enhance mobility patterns and motor functions (Nieuwboer et al., 2001; Pacchetti et al., 2000). Physical training programs are suggested to change the perception of the experienced sickness (Sunvisson & Ekman, 2001).

In addition, mental health care services (Leentjens et al., 2008), palliative care services (Goy, Carter, & Ganzini, 2008) and telemedicine (Samii et al., 2006) are provided to patients with PD as well.

Based on the previous reviews, it is to conclude that individuals with PD require

multidisciplinary health care services. The utilization patterns seem likely to be individually differential. Literature addressing to the core issue of the present study ─ key variables of health care utilization among older adults with PD will be discussed separately in the following section.

2.3.3.2 Reviewing Key Variables of Health Care Utilization in Parkinson's Disease

In the past decade, new knowledge has been generated concerning key variables of why individuals with PD seek health care services. These are described as follows:

(1) Socio-demographic characteristics: gender is proved to be predictive for health care utilization, particularly with the use of surgical interventions (Hariz et al., 2003). Parkinsonian patients with higher education levels are reported to have more physician consultation (Alkema, Reyes, & Wilber, 2006). Furthermore, living arrangements and the ownership of private health insurance are found to increase neurologist consultation rate (Mueller, 2010).

(2) Disease severity: poor health status is proved to increase health care need and, in turn, consultation rates, pharmacological treatment costs and care costs (Fujii & Masuda, 2007; Pechevis et al., 2005; Vargas et al., 2008). Additionally, disease severity is reported to predict the use of non-medical care (de Boer et al., 1999);

(3) Disease stage and duration: the type and degree of health care utilization in PD vary according to the disease stage (Carod-Artal, Vargas, & Martinez-Martin, 2007; Hariz et al., 2003), but in the long run the demand for health care services may be expected to increase with the duration and/or severity of PD (Keraenen et al., 2003; McCrone, Allcock, & Burn, 2007; Murman et al., 2003)

(4) Functional impairment/disability: diskinesia and other functional impairment are

reported to increase health care costs in PD (Pechevis et al., 2005; Vargas et al., 2008).

(5) Clinical complications and drug adjustment: the treatment of clinical complications and drug dose adjustment were found to be the most frequent reason for hospitalization (Vargas et al., 2008).

(6) Co-Morbidity: co-morbidity for PD is proved to increase resource use and health care costs. Individuals with co-morbid conditions are indicated to use more home nurse care and physiotherapist assistance (Pressley et al., 2003; Vargas et al., 2008). Furthermore, individuals with PD and Alzheimer disease have higher care costs than Alzheimer patients (Murman et al., 2003).

(7) Depression: patients with both PD and depressive symptoms are proved to have an increasing health care utilization. In addition, the psychiatric and medical co-morbidity among depression affected PD patients is higher than other PD patients without emotional disturbances, consequently the health care utilization also greater (Chen, Kales, & et al., 2006).

(8) Psychosocial variables: psychosocial variables such as social support and psychological distress of individuals with PD are found to be related to health care utilization (MacCarthy & Brown, 1989; Spottke et al., 2005). Furthermore, these are proved to influence use of non-medical care (de Boer et al., 1999).

In short, the literature review pointed out socio-demographic, disease-related and psychosocial characteristics of PD patients increase the likelihood of receiving medical treatments and health care services.

2.3.3.3 Summary

In comparison with *Section 2.3.2.2*, it is to be concluded that key variables relating to health care utilization in PD can be categorized into disease-, individual- and interpersonal-level as well. Generally, findings placed strong emphasis on the disease-level. Psychosocial issues such as disease awareness, social support, depression and control beliefs in relation to health care utilization and its outcomes have been paid little attention to date.

2.3.4 Health Care Utilization in Parkinson's Disease: Current Situation in Taiwan

The foregoing section has provided an overview of health care utilization in PD worldwide and its potential impact factors. Addressing the main topic of the present study, what is the similarity between Taiwan and these other developed countries? Since the health care system and the implementation of national health insurance in Taiwan were already presented in *Chapter 2.2* above, this section will aim at providing a preliminary insight into how Taiwanese PD patients utilize health care resources. As stated previously, there was no precise data concerning the prevalence and incidence of PD in Taiwan. Recently, a population-based study reported that the age-adjusted prevalence rates of PD were 633 for people aged 40 and over and 230 for all ages. Accordingly, the estimated number of PD patients in Taiwan (for all ages) was approximately 55,000 (Chen, Chen, & et al., 2009). However, there was an inconsistency regarding the prevalence of PD in Taiwan; the estimations were between 30,000 and 300,000 (Chen et al., 2001; Chen & Tsai, 2010).

The following section will consider primarily general health care utilization among older Taiwanese adults and review related utilization literature in PD and the local health care delivery system.

2.3.4.1 Health Care Utilization of Older Taiwanese Adults

As described above, over 65% of the older adults in Taiwan had chronic diseases, the average times of consultation in months were 2.25 and the average days of hospitalization were 17.83 days (Taiwan Department of Statistics MOI, 2005). In addition, the medical costs for this age group amounted to 33% of total medical expenses (Taiwan DOH, 2008). These data indicate significantly the increasing need for health care of the aging and aged population in Taiwan.

Over the past decade, relevant published articles on this specific topic pointed out that health care utilization among older adults in Taiwan is influenced by a range of key variables as follows.

(1) Age: as mentioned before, Taiwanese aged 70-79 have the highest personal medical care costs. (Taiwan DOH, 2006; 2008).

(2) Functional status: functional declines are found to correlate significantly with health care utilization (Mau, 1997). Cognitive impairment, particularly, is for an increased use of informal care, but not with formal service (Zimmer, Ofstedal, & Chang, 2001).

(3) Co-Morbidity: older adults with non-chronic diseases are reported to have less drug utilization in comparison with chronically ill elderly persons (Liu & Romeis, 2004).

(4) Social support: familial support/care is proved to be preferred in old age (Zimmer, Ofstedal, & Chang, 2001).

(5) Health policy: the implementation of National Health Insurance is proved to increase utilization of both out- and in-patient care of the elderly population and

such effects were more salient for people in low- or middle-income groups (Chen, Yip, & et al., 2007).

(6) Service costs: service costs are suggested to predict health care utilization of older adults (Huang & Tung, 2006).

2.3.4.2 Health Care Utilization of Older Taiwanese Adults with Parkinson's Disease

As mentioned, the age-adjusted prevalence rate of PD for all age groups is 130.1 per 100,000 population after being adjusted to the 1970 US census (Chen et al., 2001). The reported prevalence and incidence rates are close to those in Western countries.

The current proportion of Taiwanese aged 65 and over is approximately 11% of the total population and by 2030 this number is projected to be more than double (Taiwan DGBAS, 2010b). This demographic trend suggests that the number of individuals with PD in Taiwan is expected to expand seriously for the foreseeable future.

Literature reviews suggest that research work in respect of PD in Taiwan so far has mostly been dedicated to medical/neurological and pharmaceutical issues. Studies concerning health care utilization of this target group have been very limited.

One recent study indicated that the average duration in HY stages I, II and III was estimated as 2.83, 6.62 and 1.41 years, respectively (Liou et al., 2008). It was reported that the combination of Levodopa and dopamine agonists was the most frequent prescription pattern (Wu, 2005). In addition, the health care utilization increased with the progression of PD; and the house visit rates with outpatients' age, with particularly high rates for those aged over 65 years (Wu, 2005).

According to the '*Protection Law for the Handicapped and Disabled*', individuals

confirmed with this chronic disease can apply for the 'Handicapped ID' as well, which allows them to use formal home care and community-based care services such as household assistance, home-delivered meals, residence environment improvement, day care, short term care, transportation and so forth (Taiwan MOI, 2008).

Besides the formal care programs, there are government-run and private medical care institutions providing access to medical care services and to subsidised pharmaceuticals.

2.3.4.3 Summary

To sum up, the foregoing sections have examined firstly relevant studies on health care utilization among the aged population and those with PD in Taiwan. Evidences suggested following variables associating with health care utilization in PD.

(1) Variables on the individual-level, such as age, education years, marital status, living arrangements, ownership of the 'Handicapped ID' ;

(2) Variables on the disease-level, such as disease severity, disability, co-morbidity and depression; and

(3) Variables on the interpersonal-level, such as social support.

This section has mentioned the prevalence and incidence rates of PD in Taiwan and the welfare and care services currently available. Information regarding to the social-welfare related services such as ownership of the 'handicapped ID', home care and community-based care services were integrated into the study questionnaire.

2.4 THEORETICAL FOUNDATIONS

In the field of health research, there are extensive and varied health care utilization

models, which can be classified into two basic groups: models based on cognitive variables and models based on non-cognitive ones (Gochman, 1997b). The first group focuses on health cognition referring to rational processes (attitudes, beliefs, perceptions, expectations, etc.). Predictive models such as *Health Belief Model*, *Theory of Reasoned Action*, *Theory of Planned Behavior*, *Locus of Control Models*, *Social Learning Theory* are derived from the cognitive approach.

On the other hand, non-cognitive models address health care utilization with personality variables such as dependency or anxiety, demographic characteristics such as income and education, and triggers such as stressful events (Patino, 2002).

In line with these two approaches, the present study will view the construct '*health care utilization*' on one side as a '*sickness behavior*', and on the other as behavior embedded into a socio-psychological context. Hence this thesis has decided to modify the behavioral model of health care utilization by adding psychological characteristics, in order to get an insight into health care utilization and to explore its potential psychological procedures. A detailed description of the theoretical approach and the possibility of expanding the Andersen model to include psychological variables are presented in the following sections.

2.4.1 The Behavioral Model of Health Care Utilization

In the late 1960s, Andersen developed a theoretical framework for explaining and testing a variety of health care utilization behaviors. From 1968 to 1995, Andersen and his colleagues conducted related program evaluations and expanded their models through four different phases. Gochman (1997a) regarded this approach as an important and robust model in studying health care utilization. Frameworks below represent the original model and its revisions.

2.4.1.1 The Original Model

The Andersen model of health service utilization was initially proposed and empirically tested in a series of studies to explore why families use health services; to define and measure access to health care (Andersen, 1968). However, in practice the approach is most often used to determine proper amounts of health care utilization (Andersen, 1995).

The original model assumed that a progression of individual characteristics explains the type or volume of health services a person uses. These individual factors are categorized conceptually as three components: predisposing characteristics, enabling resources and need. Each of these will be clarified as follows and the framework is shown in Figure 1.

(1) Predisposing characteristics

Predisposing characteristics assume that individuals are predisposed differently to seek and use health care services. These predispositions exist prior to the decision to seek or use services and they are expected to produce differences in the outcome of health services utilization. Predisposing components include demographic, social structure and health-related belief variables.

Firstly, two demographic variables — age and gender are regarded as closely relevant to health and health services utilization. Furthermore, the social structural factors of predisposing variables focus subsequently on persons' status in society — for example, education and race/ethnicity.

Beliefs and attitudes are the final type of predisposing characteristics hypothesized to predict health care utilization. Individuals' knowledge, beliefs and attitudes toward diseases, physicians and the health care system are assumed to impact the probability

that a person will seek health services. Individuals with positive attitudes toward health care and/or who believe that they require health care interventions are supposed to be more likely to use health services than those who do not have such kinds of attitudes and beliefs.

(2) Enabling resources

Enabling resources make health services available to the individual. They can be measured by personal, family and community resources and accessibility of those resources, such as income, insurance coverage, family and social support. Variables such as region of the country and urban versus rural residence may be tied likely to the availability of health care resources and thus the health care utilization.

(3) Need

Need/illness level includes perception of need for health services, whether individual, social, or clinically evaluated perceptions of need. It is possibly the most immediate reason why an individual decides to seek or use services from the health care delivery system.

In addition, this model delineates the indicators of health care utilization according to the type of service and the reason for use.

2.4.1.2 The Andersen Model - First Revision

Approximately ten years after the original framework, Aday and Andersen (1974) expanded and refined the initial model by incorporating the health care system (see Figure 2). Health policy, resources and organization, as well as the changes in these over time are numbered among the health care system. Resources comprise the volume and distribution, including education of health care personnel and available equipment.

Organization regards to resource managements within the health care system, which are supposed to have influence on access to and structure of health services.

In the revised framework, individuals, rather than families, become the units of analysis. Individual characteristics have the most immediate influence on people's decisions about the utilization of health services.

In the updated model, the previous three categories (predisposing, enabling and need) are merged as population characteristics of health service utilization; societal determinants and the health services system are considered as important factors of individuals' health behavior as well.

The measures of health care utilization have been further expanded to include type of services received, their site, purpose and how many units of services were received during a certain period of illness. In addition, the revised model includes the recognition that health care use can be reflected and influenced by consumer satisfaction (Andersen, 1995).

2.4.1.3 The Andersen Model - Second Revision

During the 1980's to 1990's, Andersen model was again revised to form three categories (primary variables of health behavior, health behavior and health outcomes) with a linear relationship, as illustrated in Figure 3. Primary variables, including population characteristics, health care system and external environment, are postulated as the direct cause of health behaviors. Furthermore, this revised model posits that health behaviors, including personal health practices and the use of health services, exert direct influence on health outcomes (divided into health status, evaluated health status and consumer satisfaction). The inclusion of health status outcomes aims to

extend measures of access to incorporate dimensions which are important for health policies and health reforms (Andersen, 1995).

2.4.1.4 The Andersen Model - Third Revision

In the final phase, Andersen expanded the latest model into four categories (environment, population characteristics, health behavior and outcomes) and emphasized the 'dynamic' and 'recursive' nature of this framework. The revised model portrays the multiple influences on health care utilization and, subsequently, on outcomes. Also, the model is laden with feedback loops between the components and indicates that outcomes, in turn, affect predisposing characteristics, enabling resources and the perceived need for health care services as well as health behavior (Andersen, 1995). The framework in its entirety is shown in Figure 4.

2.4.1.5 Strength and Weakness of the Andersen Model

The Andersen models have been used extensively internationally in utilization, cost and even long-term care studies (Bradley et al., 2002). The vast majority of empirical research on service use and needs by older adults in the last decades has adopted the theoretical framework as well (Goldsmith, 2002). Moreover, evidences showed that it has been used successfully to predict unmet needs for services (Calsyn & Winter, 2001) and even suited to testing use of a broad array of social and health services among older individuals (Smith, 2003; Soskolne, Auslander, & Ben-Shahar, 2005) and community-based social care services (Alkema, Reyes, & Wilber, 2006).

On the other hand, Andersen models have experienced numerous criticisms. Definition and measurement of the major predictors and indicators of health services utilization have been criticised as being inadequate. Besides, the array of causal

relationship implied in the model has not been fully tested.

In practice, empirical studies based on the behavioral model have been criticised that they could merely explain a very low percentage of the overall variation of service utilization (Gochman, 1997a). Furthermore, only few studies have tested the model in its entirety (Phillip et al., 1998).

Furthermore, the Andersen model has been criticized strongly for overemphasising structural determinants and for failing to specify social-psychological process through which physical health is perceived, evaluated and acted upon (Wan, 1989). Although the model includes 'beliefs' as predisposing variables, few empirical studies (Beidenharn & Normoyle, 1991) have investigated this part of the model.

2.4.1.6 Considerations for the Present Study

Considering the previous literature review, it can be concluded that the Andersen model has covered not only components on the disease-, individual- and interpersonal-level in relation to health care utilization, but also been extended to examine multi-faceted influences referring to the health care system, the external environment and the impact on health care utilization through population characteristics.

Generally, the Andersen model has been proved to be the most frequently used theoretical framework for testing socially or environmentally determined health behaviour (Gochman, 1997a) and also in studies involving older adults (Wolinsky & Johnson, 1991).

According to the foregoing discussion, three issues concerning the present study have been raised. First, in spite of numerous criticisms, the Andersen model appears to

be the most appropriate approach. Hence the original Andersen model has been adapted in the present study to test the health care utilization of each single health service and of the utilization in its entirety. Further, since another important topic of the present study is to explore relationships between population characteristics, health care utilization and HRQOL, it may be appropriate to use the third revised version of the Andersen model, in order to understand complex paths between the constructs.

Second, it was proved that the health care utilization of older Taiwanese is influenced by variables on the system-level, specifically the implementation of National Health Insurance. As mentioned in *Section 2.2.2*, due to the fair premium rate (4.55% of the insured's income), the high enrollment rate (99.3% in 2010), the large body of service providers (91% of the medical institutes nationwide) (Taiwan Bureau NHI, 2010) and the well-structured health care resources in the area of data collection, barriers with availability and affordability of health care services are supposed to be low. Hence variables on the system-level are not examined in the present study.

Third, the original Andersen model proposed knowledge, beliefs and attitudes as the final type of predisposing characteristics and hypothesized them with predictive power regarding health care utilization. However empirical studies often failed to specify these psychosocial processes (Wan, 1989). In other words, psychological variables were largely ignored in this context.

Taking the foregoing criticism into account, there is certainly a need for greater attention to fill this empirical gap. At this point, it may be profitable to apply Bradley and colleagues' (2002) suggestion and to expand the Andersen model with components deriving from the *Theory of Planned Behavior* (TPB) (Ajzen, 1991), which postulates that beliefs, attitudes, knowledge, social norms and perceived control, influence planned

or intended behaviors (Ajzen & Madden, 1986). As discussed previously, health care utilization is proposed in this study as behaviors undertaken by a person who feels ill and seeks suitable health care services. A rational decision-making process in choosing health care services and planning their utilization is implied in this definition. Hence with help of the predictive power of TPB (Ajzen & Fischbein, 1980; Godin & Kok, 1996), a modified Andersen model is supposed to provide a reasonable conceptual frame to the present study.

2.4.2 Modifying the Andersen Model □ Other Sources of Influence on Health Care Utilization

2.4.2.1 Attitudes, Knowledge and Social Norms

Four psychological variables were added to the Andersen model (Redding et al., 2000) as follows.

(1) Attitudes towards health care are defined as personal views concerning health care systems and services.

(2) Knowledge is identified as a variable of health care utilization, consistent with the original Andersen model. It includes the content and amount of information available, the source of the information and the accessibility of the information. This variable is divided into disease-related and social welfare related knowledge in the present study.

(3) Social norms refer to the significant others or decision makers (i.e., referents, for example, spouse, children, relatives etc.).

(4) Perceived control is discussed below in more detail.

2.4.2.2 Perceived Control

Arising from the forgoing discussion, perceived control may be likely to play an important role in health care utilization. Subsequently, this section presents a literature review about perceived control as it relates to chronic illness. In the 1970s, Rodin and Langer (1997) concluded from their classical control-relevant intervention that offering choice boosted a person's sense of perceived control and hence well-being. Lots of other studies have proved that a perceived failure of control in a personally significant context can lead to a phenomenon that is described as '*learned helplessness*' (Baltes & Baltes, 1986; Decker & Schulz, 1985; Kuhl, 1986).

There have been a number of constructs that have been related to a sense of control, such as primary and secondary control, selective and compensatory control, particularly the life-span theory of control. These mentioned constructs are briefly reviewed in the following sections.

(1) Primary and Secondary Control

So far, perceived control has only been considered as a single process. Rothbaum, Weisz and Snyder (1982) regarded perceived control as a two-process model and named the new constructs: '*primary control'* and *'secondary control'*. Primary control targets the external world and tries to achieve influences in the environment external to the individual, while secondary control focuses on self and attempts to achieve changes simply within the individual. When perceived control is recognized in both primary and secondary forms, a range of inward behaviors can be seen as efforts to maintain control rather than to give it up (Rothbaum, Weisz, & Snyder, 1982).

Empirical evidences supported that chronically ill elderly with lower levels of perceived control were likely to use more health care services than their counterparts

(Chipperfield & Greenslade, 1999). Besides, subjective health status was proved to affect health control beliefs (Perrig-Chiello, Perrig, & Staehelin, 1999).

In addition, research pointed out that health-related control strategies may vary with age. For example, primary-control strategies appeared to benefit individuals less than 80 years old, whereas secondary-control strategies were likely to benefit the 'Old-Old' (Chipperfield, Perry, & Menec, 1999).

Gender differences have been identified regarding the use of control strategies, however findings were without any consistency. For example, studies indicated women having lower internality scores than men (Perrig-Chiello, Perrig, & Staehelin, 1999), whereas it is reported that when facing health problems elder males benefit by adopting certain primary-control strategies and elder females benefit by adopting certain compensatory secondary-control strategies (Chipperfield & Perry, 2006).

The next sections include a brief literature review of the *Life-span Theory of Control* and empirical findings addressing conclusioins about older adults with PD and their perceived control.

(2) The Life-span Theory of Control

Heckhausen and Schulz (1995) developed a *Life-Span Model* examining control related life transitions and argued that the main difference between primary and secondary control relates to the target of action. In primary control, the target is the external world, whereas the target is the self in secondary control. Both primary and secondary control can involve cognition and action, although primary control refers mostly to active behavior engaging in the external world, whereas secondary control is mainly a form of cognitive processes occurring within a person.

An inverted U-shaped curve for the primary control trajectory is essential in this model. It means potentials for primary control are low in early life, high in adulthood, then decline again in late adulthood (Schulz, Heckhausen, & Locher, 1991). These negative changes in primary control have often been for functional declines and health problems in old age (Heckhausen & Schulz, 1995).

The secondary control is proposed to be a compensatory mechanism for failures in primary control by acting as a buffer to their negative effects. Hence it can protect an individual's emotional well-being and self-esteem. Motivational resources of the person can be preserved by secondary control, with aims to maintain and enhance primary control in future environmental interactions. *"…In this way, secondary control serves as the pathway from loss of control back to primary control"* (Heckhausen & Schulz, 1995, p. 286).

In addition, four types of control are classified, including: '*selective primary control*' (*SPC*), '*compensatory primary control*' (*CPC*), '*selective secondary control*' (*SSC*) and '*compensatory secondary control*' (*CSC*). With SPC, individuals spend internal resources such as effort, time and ability in order to attain important goals, whereas CPC is aimed at finding external resources such as obtaining help from others. In the form of cognitive strategies, SSC can help to increase motivational commitment toward preferred goals. With CSC, individuals replace or adjust their goals which are no longer achievable.

Researchers suggested that even when primary control declines in late adulthood elderly individuals can use secondary control strategies effectively (Heckhausen & Schulz, 1995). This assumption has been examined in a large number of health psychology studies (Bailis, Chipperfield, & Perry, 2005; Chipperfield & Perry, 2006;

Chipperfield et al., 2007). For example, an increasing use of CPC strategies were found after the diagnosis of macular degeneration, while older adults with chronic vision loss were proved predominantly using CSC strategies to face their functional loss in instrumental daily activities (Wahl, Schilling, & Becker, 2007).

On the other hand, studies investigating relationships between psychological control and health care services are few. Older adults with chronic illness and low levels of perceived control were found to utilize more health services than their high-control counterparts (Chipperfield & Greenslade, 1999). Gender differences were identified in the use of primary and secondary control in later life (Chipperfield & Perry, 2006). Furthermore, on the basis of the life-span theory of control, researchers indicated positive social comparisons as a predictor to better health among older adults with low primary control strategies, by providing them with secondary control (Balis, Chipperfield & Perry, 2005).

At this point, it is necessary to note that research findings addressing life-span control were not coherent. Partial studies supported the stability of internal control in the old age, while other empirical evidences suggested that the externality increased significantly with age (Perrig-Chiello, Perrig, & Staehelin, 1999) — the exact opposite to the Heckhausen and Schulz's theory (1995).

(3) Patients with Parkinson's Disease and Perceived Control

There are not many studies investigating relationships between perceived control and health care utilization among older adults with PD. Jahanshanhi and MacCarthy (1998) found that patients with PD are eager to gather information about new types of therapy or restructure personal goals and values in line with their limitations. It is to be noted that this finding was closely related to primary and secondary control in the

Life-span Theory of Control re-established by Heckhausen and Schulz.

Unlike the results gathered from older adults with visual loss (Wahl, Schilling, & Becker, 2007), Jahanshahi and MacCarthy (1998) hypothesized that most Parkinsonian patients become active problem solvers because of the disease. It means, patients are supposed to use more primary control strategies, such as making the best use of the time when their medication is working well, purchasing assistive devices, or utilizing physiotherapy or occupational therapy services. Such efforts aim to continue to achieve their goals in the presence of this disabling chronic disease.

However, this forgoing discussion was merely partial consistent with Hillman's finding (2006), which defined as the degree to which people believe their behaviour will influence outcomes in their lives (Bertrand & Lachman, 2003). The latter study placed emphasis on the differentiation of disease severity of PD and suggested that patients' activity, knowledge in health care and control beliefs varied according to that severity. Moreover, PD patients using primary control more frequently were in the early to middle stages of the disease, while those in the middle to late stages more often appeared to implement forms of secondary control. However, patients with late-stage PD felt they had little control over their lives (Hillman, 2006).

In addition, as far as the secondary control of individuals with PD is concerned, this construct has not been well documented. One study pointed out that perceived internal secondary control had significant negative relationships on psychosocial adaptation to PD (McQuillen, Licht, & Licht, 2003). This result was consistent with the assumption of Heckhausen and Schulz (1995) and proved that individuals with PD may probably try to shift their expectations, values and perceptions.

As mentioned earlier, studies on this issue are scarce. Some focused on relationships between aspects of psychological adjustment and physical illness among individuals with PD. For example, the well-being of patients with PD was not merely dependent on relationships between disability and depression, but also on self-esteem, coping style and practical support (MacCarthy & Brown, 1989).

Furthermore, patient's perceived control was found in the context of an uncontrollable disease such as PD to be associated more with well-being and less with care-giver burden (Walihagen et al., 1997).

In respect to the psychological adaptation of PD, evidences supported that disease severity and perceived internal secondary control had a significant indirect effect on depressive symptoms and life satisfaction (McQuillen, Licht, & Licht, 2003).

To close, there is limited international data available which described the relationship between such consultations in PD. The picture of this topic is less clear. From the previous review, one firm conclusion can be drawn for the present study. Disease severity/disease stage contributes significantly to the health care utilization in PD.

2.4.2.3 Health-related Quality of Life

(1) Definitions of Health-related Quality of Life

The concept of '*quality of life*', and more specifically, '*health-related quality of life*' emerged in literature in 1920 (Wood-Dauphinee, 1999) and since then diverse definitions have been proposed. A brief review of HRQOL is presented in this section.

QOL has been recognised in health research as an important outcome (Haas, 1999). However, there is no universally accepted definition for QOL. In general, the terms

'*quality of life*', '*well-being*' and '*subjective well-being*' are often used interchangeably (George, 2006). A world-wide used definition describes this construct as follows: "*an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standard and concerns*" (The WHOQOL Group, 1995).

To narrow its extent to those aspects directly related to disease or medical treatment, the term HRQOL was introduced (Patrick & Erickson, 1988); in the medical area it was defined as "*a concept encompassing a broad range of physical and psychological characteristics and limitations, which describe an individual's ability to function and to derive satisfaction from doing so*" (Walker, 1993). In other words, HRQOL refers particularly to the health dimension of QOL.

However, the meanings of health have been changed over time, so too have the concepts of HRQOL. The traditional biomedical model of medicine, focused primarily on the freedom from disease and physical symptoms, without taking social factors into account. The later expanded biopsychosocial model postulated that biological, psychological and social factors all play significant roles in human behaviors in the context of disease (Engel, 1977). In line with this theory, the Constitution of the WHO (1994) defined health as "*a state of complete physical, mental and social well-being not merely the absence of disease and infirmity*" (p.43). According to this, health and the effect of health care must include not only an indication of changes in the frequency and severity of disease, but also an estimation of well-being.

Despite the ongoing debate about a universally accepted definition of the concept, researchers generally viewed HRQOL as a subjective and multi-dimensional construct including physical and emotional well-being. Social well-being was suggested to be

integrated into the entire concept as well (Bowling, 1997; Hass, 1999). According to Bowling (1997, p.6), HRQOL is proposed to be "*individual responses to the physical, mental and social effects of illness on daily living which influence the extent to which personal satisfaction with life circumstances can be achieved.*"

In conclusion, to date, HRQOL is composed of broad aspects including physical, functional, emotional and social well-being (Wood-Dauphinee, 1999; Cella & Nowinski, 2002).

(2) Key Variables of Health-related Quality of Life in Parkinson's Disease

In general, international studies have reported that PD has a substantial negative impact on HRQOL of patients (Behari, Srivastava, & Pandey, 2005;Dodel, Berger, & Oertel, 2001; Gage et al., 2003; Quittenbaum & Grahn, 2004; Schrag, 2006; Roh et al., 2009). Similar results were also found in China (Zhao et al., 2008).

However, despite a large number of studies on HRQOL, a wide variation in the perception of the variables which contribute significantly to QOL in individuals with PD resulted (Caap-Ahlgren & Dehlin, 2001; Carod-Artal et al., 2008; Forsaa et al., 2008; Gomez-Esteban et al., 2007; Herlofson, 2003; Hirayama et al., 2008; Just & Ostergaard, 2002; Kuopio et al., 2000; Marras et al., 2008; Oguru et al., 2010; Qin et al., 2009; Quittenbaum & Grahn, 2004; Schrag, Jahanshahi, & Quinn, 2000; Sitoh et al., 2005; Winter et al., 2009; Winter et al., 2010b; Ziropada et al., 2009).

Recently, a systematic review evaluated published studies in relation to HRQOL in PD since 1960 (Soh, Morris, & McGinley, 2010) and identified the following demographic and clinical factors as the main predictors contributing to this issue.

- Demographic characteristics: including gender, age, living status, education, income,

rural living, financial problems and co-morbidities.

- Disease characteristics: including disease severity, disease disability, disease duration, medication dosage, duration of medication and falls.

- Non-motor symptoms: including cognition, confusion, depression, anxiety, fatigue, psychosis, hallucinations, pain and headache, constipation, urinary incontinence and sleep problems.

- Motor symptoms: including dressing difficulty, self-reported functional status, bradykinesia, tremor, rigidity, number of PD symptoms, physical symptoms, clinical fluctuations, dyskinesia, dystonia, postural instability, gait impairment, axial impairment and turning difficulty.

Depression is found to be the most significant key variable impairing HRQOL. In addition, disease severity and disability are identified as predictors of poor HRQOL outcomes among patients with PD as well (Soh, Morris, & McGinley, 2010). Social factors are not included in the review.

In respect of social variables with impacts on HRQOL, Winter et al. (2009c) pointed out that social support and the number of household members play a role in affecting HRQOL among individuals with PD. Additionally, exercise and rehabilitation programs were reported to be associated positively with HRQOL as well (Baatile et al., 2000; Goodwin et al., 2008).

(3) Conceptual Models of Health-related Quality of Life

Despite a great number of studies on QOL and HRQOL, there are not many consensual conceptual models of HRQOL (George, 2006). Two of these are reviewed below. The first conceptual model, as illustrated in Figure 5, developed currently by

Ashing-Giwa (2005), focused on HRQOL of cancer survivors. According to this socio-ecological approach, HRQOL is influenced by multi-level factors, that is, at individual and macro-levels. At the individual level, HRQOL may differ according to medical, general health, health practices and psychological characteristics. At the macro-level, socio-ecological, cultural (e.g., ethnicity), demographic and health care system (e.g., access and quality) are proposed as predictors of HRQOL (Ashing-Giwa, 2005).

It is to be additionally noted that the multi-level concept above shares similarity with the Andersen model, however it is designed originally to explore HRQOL of cancer survivors, and measurement tools have not yet been well-developed (DiSipio et al, 2008).

The second model, as presented in Figure 6, was developed specifically for understanding HRQOL in PD and postulated that depressive symptoms, pain, psychological well-being and ADL have direct impacts on HRQOL, while psychiatric complications, motor symptoms, autonomic dysfunction, motor complications and daytime sleepiness on the other hand are related indirectly to HRQOL. Furthermore, influences mentioned are proposed to be mediated separately through psychological wellbeing and ADL (Visser et al., 2008).

2.4.2.4 Summary

The foregoing sections have reviewed diverse definitions of HRQOL through different phases of the health research. According to this evidence, it has been suggested up to now that HRQOL should be viewed as a multi-faceted construct including physical, functional, emotional and social well-being (Cella & Nowinski, 2002). Taking

into account the definition of health care utilization in this thesis and its emphasis on the presence of illness and on health services use, the present study will view HRQOL as "*the extent to which one's usual or expected physical, emotional and social well-being are affected by a medical condition or its treatment* "(Cella & Nowinski, 2002, p.S11).

Furthermore, the previous section discussed predictors addressing HRQOL in PD such as demographic, clinic, social characteristics and psychological variables. In addition, a number of studies identified depression as the most significant key variable impairing HRQOL. Disease severity and disability are indicated as predictors of poor HRQOL outcomes among patients with PD as well.

Two conceptual models concerning HRQOL were introduced in the previous section. Although the multi-level concept of Ashing-Giwa was similar to the Andersen model and most of the predictors are supposed to contribute to health care utilization as well, however a merge of these two complex frameworks could not be fully achieved in the current study, because research on this issue is still in its infancy. Given this limitation, the second part of this study will treat HRQOL as an outcome variable of the Andersen model, in order to provide a preliminary investigation into relationships between health care utilization and HRQOL of older adults with PD.

2.5 THEORETICAL FRAMEWORKS

2.5.1 Theoretical Framework A

Taking the foregoing discussions into consideration, two theoretical frameworks presented below will be tested in the current thesis. The first framework, as illustrated in Figure 7, is based on a modified Andersen model with the focus on examining population characteristics as well as on psychological characteristics of health care

utilization among a sample of older Taiwanese adults with PD.

The first component is *Population Characteristics*. Being the main predictive component, this independent variable includes *Predisposing Characteristics*, *Enabling Resources* and *Need*. They are hypothesized to predict health care utilization directly or indirectly. In detail, *Predisposing Characteristics* are conceptualized as gender, age, education level, marital status, number of children and living arrangements. *Enabling Resources* are conceptualized as household expenditure, ownership of handicapped ID and social support. As discussed previously, items such as insurance status are not included in the present study. Finally, *Need* is conceptualized as ADL, IADL, disease severity, disease duration and co-morbidity.

The main outcome variable is *Health Care Utilization*, which is operated firstly as utilization of each investigated health care service, then as utilization of medical services, utilization of care services, utilization of CAM and health care utilization overall.

The third part refers to *Psychological Characteristics,* including disease-related knowledge, social welfare related knowledge, attitudes toward health care, social norms, selective control and compensatory control. It would be plausible to place the psychological variables in the *Predisposing Characteristics* of the model, as the initial Andersen model designed. However since this study aims at exploring the role of psychological characteristics influencing health care utilization, *Psychological Characteristics* will be examined as a separate component in the model, fitting between the *Population Characteristics* and *Health Care Utilization*. They are hypothesized to predict health care utilization directly.

The perceived control has been firstly conceptually framed within the Life-span Theory of Control developed by Heckhausen and Schulz (1995) and is divided into selective and compensatory control in this study. The psychological characteristics are expected to predict health care utilization, however under diverse population characteristics, differently.

2.5.2 Theoretical Framework B

As reviewed, HRQOL is a very common outcome variable for chronic diseases. In recent years, an increasing number of studies has examined the role of depression and QOL among PD patients with growing concerns, not only in practice, but also in research. Subsequently, with the addition of depressive symptoms and HRQOL into the third revised Andersen model, the second framework of this study, as illustrated in Figure 8, will explore relationships, specifically paths between *Population Characteristics*, *Psychological Characteristics*, *Health Care Utilization*, *Depressive Symptoms* and the outcome variable *HRQOL*.

It is to be noted that the inclusion of psychological variables with potential effect paths in the framework is hypothesised and methodologically incomplete. Multistage statistical modelling should be employed to examine direct and indirect effects in the expanded model (Bradley et al., 2002).

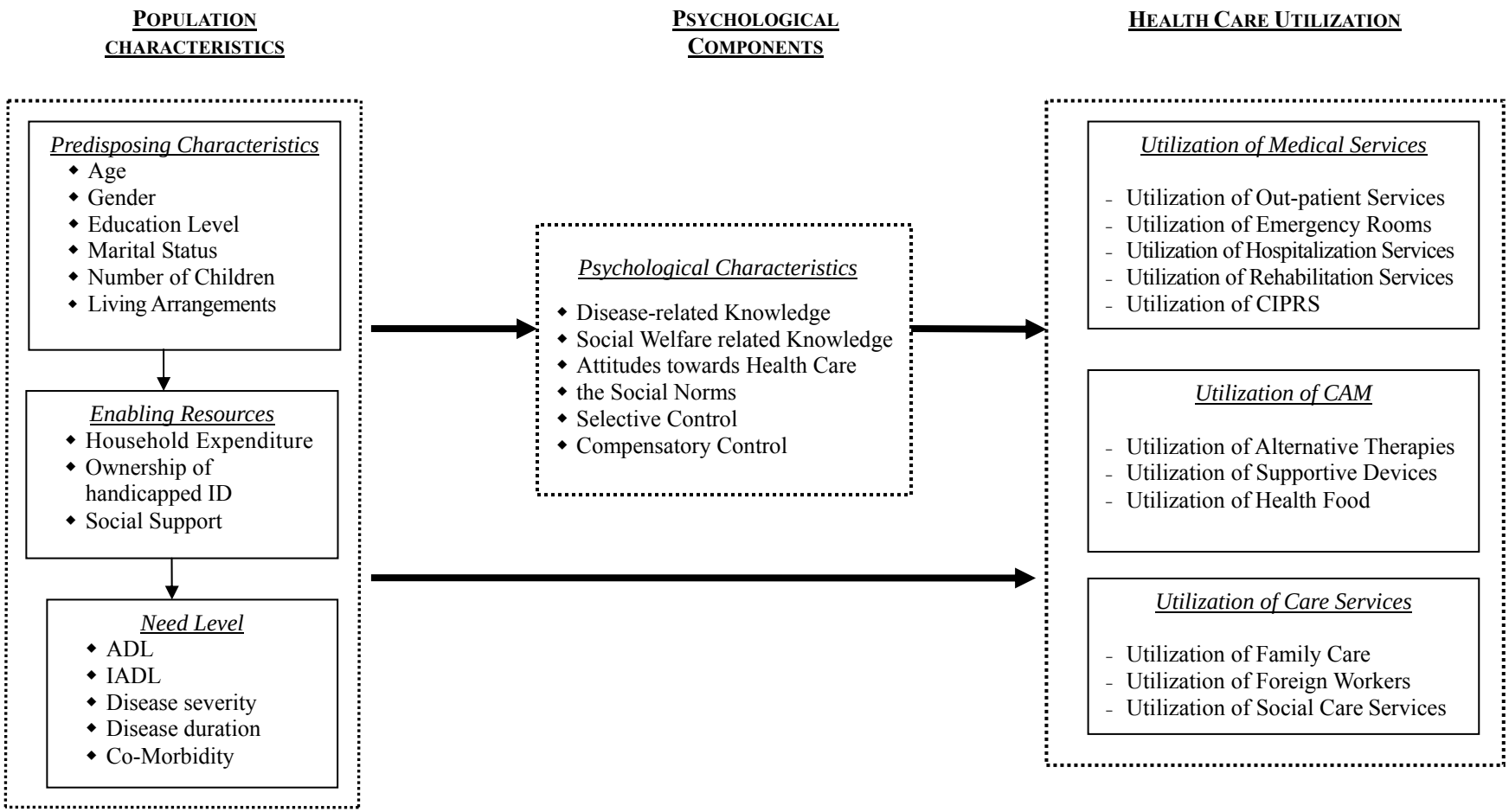

Figure 7. Proposed Framework A of the Present Study

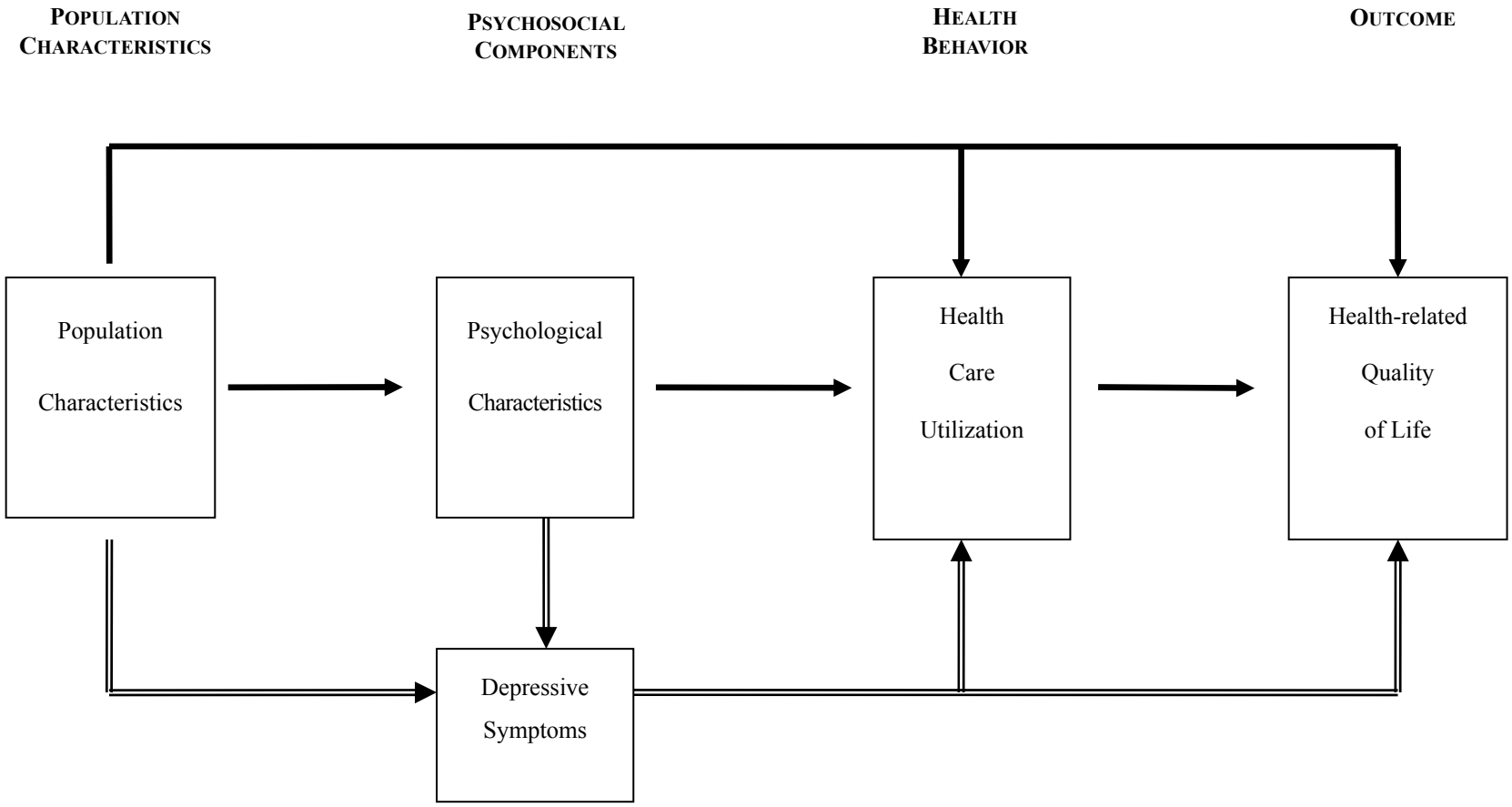

Figure 8. Proposed Framework B of the Present Study

2.6 RESEARCH QUESTIONS AND HYPOTHESES

The current study aimed at extending the Andersen model by considering the role of psychological variables in the prediction of health care utilization and relationships between health care utilization and HRQOL among a sample of Taiwanese older adults with PD. Three key research questions are addressed:

Question 1: What relation exists between the key components in the modified Andersen model?

Question 2: After expanding the Andersen model to include the psychological characteristics, what relation exists between the key components in the modified Andersen model?

Question 3: What relation exists between health care utilization and the overarching endpoint of HRQOL, while considering other key components of the modified Andersen model and depressive symptoms?

Based on the foregoing literature review, research questions and frameworks, the following hypotheses will be tested:

H1: All key components within the modified Andersen model (study framework A) are significantly related to health care utilization and relations will hold after mutual control of these components in multivariate test situation.

H1-A: More specifically, the present study expects when only the predisposing characteristics are included in the model, that they will be significantly related to health care utilization.

H1-B: The present study expects when the enabling resources are introduced into the model, they will be significantly related to health care utilization.

H1-C: The present study expects that when the need level is introduced into the model, they will be significantly related to health care utilization.

H2: The consideration of psychological characteristics will significantly add to the explanation of variance in health care utilization.

H2-A: More specifically, the present study expects that when the psychological characteristics are introduced into the model, they will be significantly related to health care utilization.

H3: Population characteristics within the study framework B are significantly related to HRQOL.

H4: Psychological characteristics within the study framework B are significantly related to HRQOL.

H4-A: More specifically, the present study expects that a high level of psychological characteristics will significantly enhance HRQOL.

H 5: Health care utilization is significantly related to HRQOL.

H5-A: More specifically, the present study expects that a high level of health care utilization will significantly reduce HRQOL.

H 6: Depressive symptoms will play a major role in the relationship between health care utilization and HRQOL.

H6-A: More specifically, the present study expects that a high level of depressive symptoms will significantly reduce HRQOL.

H6-B: The present study expects that a high level of depressive symptoms will significantly enhance health care utilization.

2.7 SUMMARY

This chapter started with a literature review referring to the health care system,

epidemiological and demographic data of the aged population in Taiwan with the focus on their health care utilization.

A medical overview of PD, as well as its diagnosis, treatment and health care utilization among individuals with this chronic neurological disorder were outlined. Further, this chapter highlighted international studies on health care utilization and its predictors, in particular among older Taiwanese adults. The Andersen model of health services utilization and its three revisions were presented.

Section 2.4.1.5 pointed out that the Andersen model, on the one hand, has been extensively used worldwide, however on the other hand it has often come under criticism for not being able to indicate fully the interactive relationships between the model components (Gochman, 1997b). Taking this criticism into account, the present tried to modify the Andersen model with psychological characteristics derived from the theory of planned behaviour, as Bradley and colleagues (2002) suggested. The additional psychological variables: disease-related knowledge, social welfare related knowledge, attitudes towards health care, the social norms and perceived control are widely used variables in health psychology, with predictive power.

Subsequently, literatures regarding perceived control, particularly the life-span theory of control, depressive symptoms and HRQOL were reviewed. Two theoretical frameworks, research questions and hypotheses were presented, which should guide this study to investigate the topic area of health care utilization and its predictors among older Taiwanese adults with PD and then to explore the complex pathways between population characteristics, psychological characteristics, health care utilization, depressive symptoms and HRQOL.

CHAPTER THREE

METHODS

This chapter provides a description of the overall methodology of the current study, including the study design, relevant processes of data collection, sample recruitment and research procedure, and outlines the development of the study instrument. An overview of data management and data analyses is presented as well.

3.1 STUDY DESIGN AND SAMPLE

The present study employed a cross-sectional approach using a self-developed structured questionnaire. A pre-testing of a draft version of the study instrument was undertaken prior to the main study. Older adults with PD who met the inclusion criteria were approached to participate in the study and completed a face-to-face interview using the structured study tool. The details of the study procedures will be outlined in the following sections.

In regard to the sample size, based on assumptions of logistic regression modelling, methods used in this thesis, a minimum ratio (e.g., 1 to 10) of the number of the IV to the sample size was recommended (Peng, Li & Ingelsoll, 2002). Furthermore, Kline (1998) suggested ten times as many cases as parameters in the path analysis as well. In accordance with this 'rule of thumb', 200 participants should be recruited for the study frameworks.

284 outpatients with PD aged 65 years and over were referred by neurological physicians. Adults with PD aged under 65 years; patients with disability due to neurological disorders other than PD, such as stroke, dementia, peripheral neuropathy,

etc.; and older adults with cognitive impairment were excluded from the study. A useable response rate of 70.4 per cent was achieved.

There were a total of 200 participants, including 104 males (52%) and 96 females (48%). The mean age was 75.07 years (ranging from 65 to 92, SD=7.47 years). On average, the participants had an ADL score of 73.18, a disease severity score of 2.49 (according to the Hoehn-Yahr scale) and had been confirmed to have PD for 6.51 years.

3.2 STUDY PROCEDURE

The data collection period covered 17 weeks altogether, from April 06th to July 31th 2009. A formal ethical review and approval for data collection was obtained prior to commencement of the study through each Institutional Review Board (IRB) of the participating hospitals in Taipei, including the Tri-Service General Hospital, Tri-Serve General Hospital Ting Chou, Taipei Medical University Hospital and Shuang Ho Hospital. The area where the data collection located is well provided with health care resources.

The questionnaire was designed to be completed during a person-to-person interview. A total of 284 potential participants, referred by neurological physicians, were contacted by the researcher in a separate area of the neurological department and screened to determine whether they met the inclusion criteria. If so, they were invited to join the study. Before participating in the study, these individuals were handed an information sheet and a consent form.

Among the 284 individuals, eleven (3.87%) failed to meet the inclusion criterion of age (>= 65 years), fifty-four (19.01%) refused to participate in the study and nineteen (6.69%) could not complete the entire questionnaire. A final useable response rate of

70.4 per cent was achieved, which included a sample of 200 participants.

3.3 STUDY QUESTIONNAIRE

3.3.1 Developing a Draft Questionnaire

According to the previous literature review, the current study was able to take advantage of some of the most relevant items and scales from well-known research programs or existing scales as follows:

(1) *The PD MED Study*. This study aimed at determining which kinds of drugs provide the most effective control for PD patients. The questionnaire booklet included standard assessments, such as PDQ-39 (Jenkinson et al., 1997), the EuroQOL EQ-5D (Siderowf et al., 2001) and developed items additionally for measuring health care utilization patterns (Birmingham Clinical Trials Unit, 2008).

(2) *The Unified Parkinson's Disease Rating Scale* (*UPDRS*). This 55-item scale consists of assessments in four domains including mood and cognition (UPDRS I), activities of daily living (UPDRS II), motor symptom severity (UPDRS III) and complications of treatment (UPDRS IV) (Fahn & Elton, 1987). It is widely applied across the clinical spectrum of PD, with comprehensive coverage of motor symptoms, however it does not explicitly examine HRQOL (Kleiner-Fisman, Stern, & Fisman, 2010).

(3) *The Behavioral Risk Factor Surveillance System* (*BRFSS*). The BRFSS, established in 1984, is a state-based system of on-going health surveys in the United States. CDC has developed standard core questionnaire for gathering information on health risk behaviors, health status, self-efficacy, preventive health

practices and health care access related to chronic diseases (U.S. National Centres for Chronic Disease Prevention and Health Promotion (CDC), 2008).

(4) *Health, Health Care Utilization in People with Intellectual Disabilities in Taiwan*. Using the Andersen model, this survey collected data from the intellectual disabled population in Taiwan, including demographic, socioeconomic characteristics, health-related aspects of lifestyles, self-perceived health status, functional disorders und use of health services (Li, 2002; Lin et al., 2007; Lin, Yen et al., 2005).

(5) *The Medical Outcomes Study 36-Item Short-Form Health Survey* (*SF-36*). This scale is widely used to test mental and physical well-being (Ware & Hays, 1988; Ware, Kosinski, & Keller, 1996; Ware & Sherbourne, 1992).

Items were then pooled together to consequently construct a draft questionnaire (Table 2). This draft version was examined through a pre-testing exercise as illustrated below.

3.3.2 Pre-testing the Draft Questionnaire

Pre-testing was conducted using ten older adults with PD selected through hospital contacts. The main purpose of this pre-testing aimed at examining the clarity of instructions and items, assessing format and layout, and particularly the time-burden issues. The pre-testing was administered under similar instruction conditions to the main study. The respondents, referred by the physicians in the neurology OPD departments, were asked to complete the questionnaire and to talk about the questionnaire afterwards. The response time was measured by the researcher. The psychometric characteristics of the pre-testing were not formally evaluated.

Five males and five females with a diagnosis of PD and a mean age of 67.2 years were recruited in the stage of pre-testing. The version took on average one and half hours to complete. Overall, the results indicated the need to reduce the length of the draft version and to simplify complicated phases. Hence UPDRS (55 items) and the MOS Social Support Survey (19 items) were removed from the draft.

Furthermore, responses showed that older adults failed to recall the total number of their health care appointments during the last three months. To address this issue it was decided to change the frequency items regarding the utilization of diverse health care services into dichotomous variables.

3.3.3 Recommendations from the Panel of Experts

Based on the feedback above, a new questionnaire version was developed. Eight experts (Appendix A) in the related research field reviewed the new draft questionnaire and assessed each item for content validity. The results of the assessments addressing content validity index (CVI) are shown in *Section 3.3.6*. Other recommendations made by the panel of experts for modifying the draft questionnaire are presented as follows.

The expert panel, considering the restricted capabilities and concentration of older adults with PD, recommended that the social support scale may focus on four items regarding tangible support, because tangible support should be associated more closely with health care utilization than the remaining items. Since the UPDRS was not applied because of time burden issues, PDQ-9 was suggested to be included, however this scale is often used to examine QOL among individuals with PD, but not disease severity. Furthermore, due to potential high correlations between the initially existing '*need*' items, an item reduction should be undertaken.

Furthermore, experts suggested that the current study should add a quick ADL assessment (Mahoney & Barthel, 1965) before conducting the questionnaire and re-construct the study instrument with the GDS-15 and SF-12. In addition, experts' feedbacks on items in relation to phrasing and clarity were subsequently integrated into the final questionnaire.

3.3.4 Final Questionnaire

This section describes the final study instrument: '*Health Care Utilization Questionnaire of Taiwanese Older Adults with PD'* and examines variables of interest to the present study. The questionnaire can be viewed in Appendix B.

3.3.4.1 Measurement of Predisposing Characteristics

The variables measured below were designed to consider the predisposing characteristics of the modified Andersen model discussed earlier. Using items derived from health care utilization studies in people with intellectual disabilities in Taiwan (Lin et al., 2005; 2007), predisposing information was accessed with gender (*female*=0; *male*=1), age (in years), education level (1=*illiterate*; 2=*primary school*; 3=*junior high school*; 4=*senior high school*; 5=*college and above*) and marital status (1=*married*; 2=*widowed*; 3=*devoiced*; 4=*single*; 5=*others*). Based on the prior literature review, considering health care utilization, the number of children and living arrangements (1=*living alone*; 2=*living only with spouse*; 3=*living with family members*; 4=*living in a care facility or nursing home*; 5=*others*) were suggested to be included to access the socio-demographic background of the participants.

3.3.4.2 Measurement of Enabling Resources

Enabling resources represent the capacity to use health care services and primarily

constitute the ‘economic’ component of the Andersen model (Andersen & Newman, 1973). However due to the interest of this study in exploring the utilization of social welfare and the aspect of social support, the current thesis additionally investigated ownership of the handicapped ID and social support to represent the enabling dimension.

Firstly, because of the high rate of non-employment among older adults aged 65 and over in Taiwan, items regarding participant’s employment status and income were not examined, but rather monthly household expenditure (1=*<20,000 TWD*; 2=*20,000–39,999 TWD*; 3=*40,000–59,999 TWD*; 4=*60,000–79,999 TWD*; 5=*80,000 and over*; 6=*not aware clearly*). In addition, self-evaluated economic status was investigated using items adapted from the OASIS study (*“How is your current financial situation?*”, 1=*very comfortable*; 2=*comfortable*; 3=*I have to be careful, but I get by*; 4=*difficult*; 5=*very difficult*) (Lowenstein & Ogg, 2003).

Furthermore, the participants were asked to indicate their ownership of the handicapped ID with the following 3 questions: *“Do you hold the handicapped ID?”* (1=*yes* or 2=*no*), *“What kind of handicap do you have?”*(1=*balancing mechanism disability*; 2=*limbs disability*; 3=*mental disability*; 4=*multiple disability*; 5=*others*) *and “which level is your handicap?”*(1 =*mild*; 2=*moderate*; 3=*severe*; 4=*very severe*).

Specifically, social support was examined using the *MOS Social Support Survey Tool* (*MOS SSS*). This tool was developed for patients with chronic conditions in the *Medical Outcomes Study* (*MOS*) (Sherbourne & Stewart, 1991). Comprising nineteen items, the social support scale covers the following dimensions including tangible support, affectionate support, emotional and informational support, positive social interaction and additional item. Each item is responded by a 5-point Liker-type scale to

indicate how often the respondent receives support, with 0 representing '*none of the time*' and 5 representing '*all of the time*'. Studies reported a high internal consistency (alpha .97), test-retest reliability (.78) and item-scale correlation (>.72) of this scale (Sherbourne & Stewart, 1991).

Using five items derived from the *MOS SSS*, the present study asked participants how often they receive tangible supports such as meal preparation, accompaniment to doctors' visits and information, in case of illness (1=*never*; 2=*occasionally*; 3=*sometimes*; 4=*often*; 5=*always*). Responses ranged from 5 to 20, with higher scores indicating having stronger social supports.

According to the review of relevant studies, the measurement of these variables is thought of as constituting the enabling resources of the modified Andersen model. The analysis of Cronbach's alpfa for these *MOS SSS* items was .80 in this study.

3.3.4.3 Measurement of Need

The present study investigated functional status, physical health status and disease severity to define the need level of the participants. Prior to the face-to-face interviews, the author carried out a quick ADL assessment with the participants. The *Barthel ADL Index* includes 10 basic activities such as dressing, bathing, feeding oneself, toileting, mobility in bed, transferring into and out of a bed and a chair and walking across the room or outside the home (Mahoney & Barthel, 1965). The total scale range was from 0-100, with higher scores indicating better activities of daily living and it is proposed as the standard index measuring performance in ADL, also of functional independence in the domains of personal care and mobility (Wade & Collin, 1988). In Taiwan, this instrument is widely used to measure disability as well. It has been proved to have high

internal consistency and convergent and predictive validity in assessing ADL functions in disabled individuals in Taiwan (Hsueh, Lee, & Hsieh, 2001).

Furthermore, eight items adapted from the *IADL scale* of Lawton and Brody (1969) were used to measure the respondents' functional status as well. In spite of its self-report nature, the *IADL* scale is widely considered to be an objective measure of functional status in later life (Lawton & Brody, 1969). This scale examines the capability to do household chores such as shopping, preparing meals, doing laundry, making phone calls, catching buses, taking medications and dealing with financial matters independently or needing help or supervision. Scoring on the raw questionnaire assigned 0-2 points to capability. Responses to these eight items were scored, summed up and the total presented as a score out of sixteen, with higher scores indicating better performance of IADL and lower scores showing more need of help or supervision in the instrumental activities of daily living (Fillenbaum, 1985). The analysis of Cronbach's alpfa for *IADL* was .88 in the present study.

Addressing physical health status, the incidence of co-morbidity was assessed using a checklist of fourteen chronic diseases, including high blood pressure, diabetes, heart or circulation problems, stroke, any variety of cancer, arthritis or rheumatism, lever problems, urinary problems, asthma or chest problems, digestive disease, eye troubles, hearing problems and other specified problems. These items were developed from studies conducted by Lin et al. (2005; 2007).

Affirmative responses were totaled to create an index of co-morbidity. This checklist approach did not take the severity of these health conditions into account, however this summary measure has been proved to gain understanding of the burden of illness on older adults (Rijken et al., 2005).

Additionally, using one self-developed item concerning disease duration and the *Hoehn and Yahr Rating Scale*, information was sought on participants' disease severity. Hoehn and Yahr first documented the progression of PD in 1967 and their scale is still widely used as a simple tool to stage the progression of the disease (Hoehn & Yahr, 1967). The scale comprises:

(1) Stage One: (A) signs and symptoms on one side of the body only; (B) symptoms mild; (C) symptoms inconvenient but not disabling; (D) usually presents with tremor on one limb; (E) friends have noticed changes in posture, locomotion and facial expression.

(2) Stage Two: (A) symptoms are bilateral; (B) minimal disability; (C) posture and gait affected.

(3) Stage Three: (A) significant slowing of body movements; (B) early impairment of equilibrium on walking or standing; (C) general dysfunction that is moderately severe.

(4) Stage Four: (A) severe symptoms; (B) can still walk to a limited extent; (C) rigidity and bradykinesia; (D) no longer to live alone; (E) tremor may be less than earlier stages.

(5) Stage Five: (A) cannot stand or walk; (B) invalidism complete; (C) requires constant nursing care.

3.3.4.4 Measurement of Psychological Characteristics

The disease-related knowledge was assessed with three self-developed items determining whether participants agreed to the necessity of regular OPD visits and

medication (1=*very disagree*; 2=*disagree*; 3=*neither disagree nor agree*; 4=*agree*; 5=*very agree*) and the need of rehabilitation (1=*no*; 2=*yes*).

In respect to the social welfare related knowledge, three items were included to investigate respondents' awareness of the handicapped ID, the health insurance subsidy and the social care services (1=*no, I don't know*; 2=*heard about it, but I don't know it clearly*; 3=*yes, I know*).

Attitudes towards health care services were assessed with three items adapted from Andersen (1976). The respondents were asked to indicate their agreement with the following statements: "*If you wait long enough, you can get over almost any diseases with seeing a doctor"*, "*I avoid seeing a doctor whenever possible"* and "*I only go to a doctor, if there is no other option"* (1=*very agree*, 2=*agree*, 3=*disagree*, 4=*very disagree*).

Furthermore, one item addressing the social norms asked the participants to indicate the person who arranged most of the health care services for them (1=*on your own*; 2=*spouse*; 3=*son and daughter-in-law*; 4=*daughter and son-in-law*; 5=*other people*).

Finally, the perceived control was assessed using the *Health Engagement Control Strategies* (*HECS*) scale developed by Wrosch, Schulz and Heckhausen (2002). This scale was initially developed from the health-specific *Optimization in Primary and Secondary Control Scales* (Schulz & Heckhausen, 1998). Items such as "*I invest as much time and energy as possible to improve my health "* and *"When I am faced with a bad health problem, I try to look at the bright side of things"*are included. The respondents were requested to answer how true each statement is for them on a 5-point scale, ranging from 1 (=*almost never true*) to 5 (=*almost always true*). Empirical studies

showed that the Crobach's alpha of all item scores was 0.82 (Wrosch & Schulz, 2008; Wrosch, Schulz, & Heckhausen, 2002). The analysis of Cronbach's alpfa for *HECS* was .91 in the current study.

3.3.4.5 Measurement of Health Care Utilization

The health care utilization measure was a eleven item questionnaire intended to assess four types of health care services used when the participants used hospitalization services, visited emergency rooms in the last two years, and consulted physicians in out-patient departments, used REHA services, CIPRS, alternative therapies, supplemental health food, supportive devices, social care services, had a foreign domestic worker and had a constant family care-giver in the previous three months.

For each item, there was a two-level response scale (*use* or *no use*) of the examined type of health care services in the preceding two years or three months, respectively. These items were adapted from the *PD MED study* (Birmingham Clinical Trials Unit, 2008). Scoring on the raw questionnaire assigned one and two points to each item. For analysis, data were transformed and computed. Utilization of each single service is examined. A similar approach had been used in the study of de Bore et al. (1999). Furthermore, single services are aggregated into medical, CAM, care services and overall health care services. In previous research, Duan et al. (2007) and Prosser (2007) had used a similar approach categorizing self-reported health services use measures. In the current study, the total score of the four types of utilization ranged from 0 to 5, 0 to 3, 0 to 3 and 0 to 11, respectively. Higher scores indicated high health care utilization, whereas lower scores showed less utilization of the services investigated.

It is to be noted that for the purpose of study framework A, health care utilization was regarded as a dependent variable, while this construct was considered as independent in framework B when determining the effect of health care utilization on HRQOL.

3.3.4.6 Measurement of Depressive Symptoms

The *Geriatric Depression Scale short form* (*GDS-15*) was included to yield an overall score regarding depressive symptoms. As reviewed previously, depression is a common co-morbid condition in PD. However, due to overlapping symptoms it is difficult to assess depression in patients with PD. On the other hand, GDS, widely used, has been shown to be a valid and reliable instrument for screening purposes (Schrag et al., 2007). GDS-15 has been used to investigate the level of depressive symptoms in a community based group of patients with PD (Meara, Mitchelmore, & Hobson, 1999). Hence it was decided to apply this scale to determine the current presence of depressive symptoms.

Initially, GDS-15 was developed by Brink and colleagues (1982) and aimed at screening depression among elderly individuals. It was further validated by Yesavage et al. (1983) for easier use and better acceptability (Sheikh & Yesavage, 1986) and has been demonstrated to have excellent internal consistency (alpha=.94) and test-retest stability (r=.85), as well as good construct and discriminate validity. According to the original validation studies (Sheikh & Yesavage, 1986; Yesavage et al., 1983), the cut-off scores used for GDS-15 was 4/5. It has been validated across different clinical settings and languages, as well as in Chinese (Liu, Lu, Yu, & Yang, 1988). The analysis of Cronbach's alpfa for *GDS-15* was .89 in the present study.

3.3.4.7 Measurement of HRQOL

SF-12 Health Survey, a short form of the *SF-36*, is one of the most used screening devices applied to measure HRQOL. Two summary measures of physical and mental health can be calculated separately. The *SF-36* has proved useful in comparing general and specific populations, estimating the relevant burden of different diseases. Particularly, one recent study indicated SF-36 with better responsiveness than PDQ-39, although the last one has specific contents explaining HRQOL among individuals with PD (Brown et al., 2009).

The present study decided to assess the participants' HRQOL using *SF-12*. Firstly, respondents were asked the extent to which their health limited them in their ability to engage in various activities on a 3-point scale. Furthermore, items concerning mental health state, physical and social functioning, physical and emotional health, pain and vitality are included, measured on a 5-point scale. Responses ranged from 12 to 60, with higher scores indicating stronger HRQOL (Ware & Hays, 1988; Ware, Kosinski, & Keller, 1996). The analysis of Cronbach's alpfa for *SF-12* was .86 in the present study.

3.3.5 Evaluation of the Validity and Reliability of the Questionnaire

The validity and reliability of the questionnaire were evaluated by the content validity index and Cronbach's alpha coefficient, respectively. The results are presented as follows.

3.3.5.1 Content Validity Index

As mentioned previously, the panel of eight experts, reviewing the modified version of the draft questionnaire, rated each item as a valid measure of the related construct applying a five-point Likert scale (1=*strongly disagree*, 5 =*strongly agree*) in relation to the following criteria (1) applicability of content: this referred to the choice of scales and content with local cultural characteristics and research issues; (2)

expression and wording of the questionnaire.

Overall, the Content Validity Index (CVI) (Lynn, 1986) of the draft questionnaire was calculated as .87, higher than the recommended minimum acceptable score such as .78 (Grant & Davis, 1997; Polit & Beck, 2006).

3.3.5.2 Reliability

Cronbach's alpha coefficients were used to test the reliability of the instruments. The size of the study sample, Cronbach's alpha coefficients, mean scores and standard deviations of *IADL*, *MOS SSS* (five items), *PDQ-8*, *HECS*, *GDS-15* and *SF-12* are outlined in Table 5. The values of Cronbach's alpha for the Chinese version of the scales were between .80 and .95. Hence the reliability of the scales applied in this study was confirmed.

3.4 Data Management

After data collection, steps concerning ethical issues were undertaken. Data or records of this study were stored in computer files, coded to protect anonymity. Access was restricted to the author. Only aggregate data relating to participants has been presented or published to date and results will be published or presented in a form that ensures that participants can not be identified.

In this study, data management included data coding, entry and checking. The SPSS Version 16.0 (SPSS Inc., Chicago, IL, USA) was used for data storage and data cleaning. Any discrepancies were resolved by referring to the original questionnaires.

3.5 Methods of Statistical Analysis

SPSS Version 16.0 and LISREL Version 8.72 were used to calculate statistics.

Descriptive statistics, Pearson's correlation, Cronbach's alpha coefficients, factor analysis, t- tests and chi-square statistics were performed. The main quantitative methods used were regression analyses and path analyses to generate predictive models and identify predictor variables. All results were considered significant at the p<=.05 level.

The following sections present an overview of the strategies used to examine the data and to test whether it matched the assumptions.

3.5.1 Logistic Regression

The logistic regression model is a type of generalized linear model that extends the linear regression model by linking the range of real numbers to the 0-1 range (SPSS Inc., Version 16). The assumptions of this non-parametric technique are described as follows. Firstly, it does not rely on distributional assumptions (Menard, 2002) and independent variables can be either continuous, discrete, or a mixture of both (Tabachnick & Fidell, 2007). Second, the ratio of cases to variables should be sufficient so as not to produce extremely large parameter estimates and standard errors. In other words, the number of cells with no cases ('*zero cells*') should be limited. It is suggested that all expected frequencies should be greater than one and that there should be no more than 20% of expected frequencies less than five (Tabachnick & Fidell, 2007). Third, multicollinearity should be viewed with concern, because it can lead to biased estimates and inflated standard errors (Menard, 2002).

In general, classification tables, scatter graphs and correlation matrices can be used to check the correlation issue between variables. It is to be noted while the correlation coefficient between variables is greater than .70, issues regarding variance inflation should be considered (Tabachnick & Fiedell, 2007).

Further, using the same approach as for the evaluation of multicollinearity in multiple regression, in other words, calculations such as correlations, variance inflating factors (VIF>5) and tolerance (<.02) can be applied to detect variables which are highly collinear with other predictor variables (Urban & Mayerl, 2006).

Furthermore, pseudo R-Square statistics such as Cox and Snell's R-Square and Negelkerke's R-Square ranging from 0 to 1 present the effect size of the regression model. They are most useful when comparing competing models for the same data. The model with the largest R-Square statistics is 'best' according to this measure. Finally, SPSS recommends models with continuous covariates and studies with small sample sizes to use the Hosmer-Lemeshow statistic to check the goodness-of-fit (SPSS Inc., Version 16). This mentioned statistic indicates a poor fit if the significance value is less than .05 (SPSS Inc., Version 16).

In the current study, the outcome variable in framework A was initially tested separately to preserve the detail of the information collected. Each response was dichotomous (*use* was coded as 1 and *no use* 0). Hence the logistic regression modeling was conducted to examine variables predicting the utilization of each investigated health care service. The procedures are as follows: firstly, the predisposing variables were entered into the model. Then predictive effects of the enabling variables were tested in the second step. Further, the third block included additionally the need variables. At the very end, the psychological variables were added into and strained for significance.

3.5.2 Path Analysis

Path analysis is an extension of the regression model, which presents "*a method of measuring the direct influence along each separated path in such a system and thus of*

finding the degree to which variation of a given effect is determined by each particular cause" (Wright, 1921, quoted in Kendall & O'Muircheartaigh, 1977, p.9). It is reported that hypothesized models can be tested in path analysis (Steele, Tinmouth, & Lu, 2006). An increasing number of empirical studies are using path analysis to investigate health care use among specific populations (Steele, Tinmouth, & Lu, 2006; Suzuki et al., 2007). In addition, path analysis can be considered as a special case of structural equation modeling (SEM) with a structural model, not a measurement model (Shipley, 2002).

Generally, a path model is a diagram relating exogenous and endogenous variables. Exogenous ones are those with no explicit causes. Endogenous variables are consisted of intervening causal variables and dependents. When an endogenous variable is linked to the dependent variable directly, there is a direct effect. When an endogenous variable has an effect on the dependent variable through other variables, there is an indirect effect. A path analysis begins with the construction of a path diagram presenting relationships between variables with direct and indirect effects (Kendall & O'Muircheartaigh, 1977; Stage, Carter, & Nora, 2004).

This modeling procedure is computed based on assumptions such as linearity, interval level data, uncorrelated residual terms, adequate sample size (at least 200) and low multicollinearity (Stage, Carter, & Nora, 2004). Besides, disturbance terms are assumed to be not correlated to endogenous variables. However when dealing with sample data, the assumed zero correlations in the population between the disturbance terms and variables will not be exactly adhered to. Hence before undertaking the path analysis, zero-order correlation tests should be carried out to derive unbiased estimators of the coefficients (Kendall & O'Muircheartaigh, 1977).

To evaluate how a path model fits the data, it is recommended to use four goodness-of-fit indices: the chi-square, the root mean square error of approximation (RMSEA), the comparative fit index (GFI) and the norm fit index (NFI). Non-significant chi-square values, RMSEA values less than .08, GFI and NFI values greater than .95 indicate that the model fits the data (Hu & Bentler, 1999). Relevant measures in relation to the present study and violations of the above mentioned assumptions of the modeling techniques will be reported in *Chapter 4*.

3.6 SUMMARY

This chapter has outlined the sampling method of this study and described the methods and procedures for conducting a questionnaire study in the form of face-to-face interviews. Based on referrals from neurological physicians, 284 older adults aged 65 and over were contacted, 200 of them were recruited. Recruited criteria were mentioned. Furthermore, the chapter has explained the development of the study instrument. The final '*Health Care Utilization Questionnaire of Taiwanese Older Adults with PD*' was established for a questionnaire study in the form of face-to-face interviews. In addition, the reliability and validity of the measures were evaluated. Data analysis methods were outlined as well. It is to be mentioned that a growing body of empirical research investigating health care utilization and health outcomes such as HRQOL had used path analysis to examine associations and underlying interactions of key variables (Suzuki et al., 2007; Visser et al., 2008). Since the inclusion of psychological variables with potential effect pathways in the study framework was hypothesized and methodologically incomplete (Bradley et al., 2002), path analysis was employed to examine direct and indirect effects in the modified Andersen model.

CHAPTER FOUR
RESULTS

This chapter focuses specifically on the findings of the current study, firstly on describing characteristics of health care utilization among a sample of older Taiwanese adults having been diagnosed with PD and secondly defining relations between key variables in the modified Andersen model, particularly, the role of the psychological ones. Results concerning the first two research questions are presented in *Sections 4.1* to *4.3*.

In detail, the descriptive statistics are reported in *Section 4.1*. Prior to demonstrating the main findings of logistic regressions in *Section 4.2*, issues considering relevant multicollinerarity tests are discussed. Moreover, *Section 4.3* examines and reports various relationships among variables in the study framework A, specifically direct and indirect effects on the four different kinds of health care utilization based on a series of path analysis.

Finally, *Section 4.4* addressing the third research question explores relationships between health care utilization and the overarching endpoint of HRQOL, while considering key constructs of the Andersen model and depressive symptoms. The structural concept of the study framework B is examined, exploring HRQOL in diverse multivariate test situations.

4.1 DESCRIPTIVE ANALYSIS

4.1.1 Predisposing Characteristics

There were a total of 200 participants, including 104 males (52%) and 96 females (48%). The mean age was 75.07 years (ranging from 65 to 92, SD=7.47 years). 18.5%

(n=37) reported themselves as illiterate. 23% (n=46) had a primary education of six years or less, almost the same proportion (20%, n=40) of participants had completed junior high school (9 years). The rest of the study sample had achieved senior high school level or more.

Over half the participants (55%) were married. 35% reported their marital status as widowed, and 7.5% as single. The average number of children was 3.16, ranging from 0 to 8 each. The majority (76.5%, n=112) was community-dwelling, living with family members. 56% lived in a traditional three-generation household, that is, with spouse and married/unmarried children/grandchildren or relatives, while the other 20.5% lived merely with their spouse. 8% lived alone. The other 14.5% (n=29) lived in facilities or nursing homes.

4.1.2 Enabling Resources

Approximately one-third of the study sample (31.5%, n=63) reported their monthly household expenditure as being between 40,000 and 59,999 NT$, whereas 1.5% of the participants were in the lowest expenditure category (household expenditure below 8,000 NT$). However, 6% of the respondents did not know an exact answer or refused to respond to the question. Around 25% of participants (n=49) own handicapped ID. 20.4% (n=10) of the ID holders were categorized into a mild handicap level, 42.9% (n=21) moderate, 30.6% (n=15) severe and 6.1% (n=3) profound. The majority reported they always got help if they were confined to bed (66.5%, n=133), needed someone to take them to visit doctors (68.5%, n=137), needed support in preparing meals (76%, n=152) or in performing daily household chores (69%, n=138). These results indicated participants perceived a high percentage rate of tangible support. Concerning information support, only less than the half frequently (24%, always; 20%,

often) received disease-related information. The mean score for social support was 21.11 (SD=4.19). Table 6 summarized the means and standard deviations of the predisposing and enabling components.

4.1.3 Need Level

On the question of self-reported health status, 3% of participants perceived their health status as excellent and very good, 17% as good and 34.5% as usual, whereas around half of respondents (45%) evaluated their health status as poor. The need level of participants, mostly disease related, is outlined as follows.

ADL scores ranged from 0 and 100, with higher scores indicating greater independence in daily life and therefore a lower impact on health problems. The mean score for this sample was 73.18 with a standard deviation of 31.39. *IADL* scores ranged from 0 and 12. The mean score for this sample was 7.17 with a standard deviation of 4.67.

Disease severity was evaluated on the basis of the five-point *Hoehn and Yahr Clinical Rating Scale* (HY Scale), the majority, 40% (n=80), of participants was diagnosed in stage 1, namely with unilateral effects. 14% (n=28) experiencing bilateral involvement and 19% (n=38) with defective posture, were in stages 2 and 3 respectively. 11.5% (n=23) of the study sample were categorized as stage 4 patients with severe motor impairment, but they could still walk or stand with assistance. 19.5% (n=31) were patients with stage 5 who could not move without assistance and were confined to a bed or wheelchair. The average HY stage score was 2.49 (SD=1.49, range=1-5). On average, the participants were moderately affected.

21% (n=42) of participants reported they were dealing next to PD with no other

chronic health conditions, while co-morbidity appeared to be extraordinary high among a large proportion of participants (79%, n=158). Among them, 53% (n=106) were affected with 1-3 chronic disorders and 26% (n=52) suffered chronically from 4 or more than 4 diverse illness.

The three most frequent chronic diseases of participants were high blood pressure (48.5%, n=97), rheumatism or arthritis (24.5%, n=49) and heart disorders (22.5%, n=45), followed by urological problems (22%, n=44), diabetes mellitus (19.5%, n=39) and ophthalmological disorders (18%, n=36).

Although most participants reported having symptoms for a period of time before being diagnosed with PD, disease duration was calculated according to actual time since diagnosis. 5% had been diagnosed recently, namely less than 6 months previously. Around 75% of participants had had PD for 1–10 years, about 20% for more than 11 years. The duration of illness ranged from 0 (recent diagnosis, less than 1 year) to 20 years, the average duration of PD was 6.51 (SD=4.96) years. The need level of the study sample is presented in Table 7.

4.1.4 Psychological Characteristics

The possible score range on disease-related knowledge was 3 to 12. The overall average total score was 9.39 (SD=1.89, range=3-12). 74% (n=148) of participants agreed strongly or agreed with the chronic nature of PD, only 4.5% (n=9) held the contrary opinion. 77% expressed their agreement with the necessity of visits to out-patient departments (26.5% *strongly agreed*; 50.5% *agreed*), in order to control disease progression. However, over half (50.5%) believed that there is no need for patients with PD to receive rehabilitation services.

The possible score range on social welfare related knowledge was 3 to 9. The overall average total score was 4.71 (SD=2.12, range=3-9). 58.5% (n=117) of participants did not realize that they were qualified to apply for the handicapped ID, 19.5% (n=39) were not sure and 22% (n=44) were totally not aware of this welfare service. A knowledge deficit regarding possible health insurance subsidies was also found among the participants (60.5% *not know*; 18.5% *not sure*). In addition, merely 11.5% (n=23) reported their awareness of these services at all. The majority of participants (64.5%, n=139) had never heard about the social care programs.

The possible score range on attitudes towards health care was 3 to 12. The overall average total score was 8.89 (SD=2.22, range=3-12). 74% (n=148) agreed strongly or agreed with the statement: "*If you wait long enough, you can get over almost any disease without seeing a doctor*", yet 22.5% (n=45) actually still visited a doctor. 25% (n=50) avoided health care intentionally, but the majority (65%, n=150) acted to the contrary. Furthermore, 29% (n=58) agreed with the statement: "*I only go to see a doctor, if there is no other option*".

The social norms were defined assuming that a person arranged most health care services for a participant. Results showed 29.5% (n=59) arranged health care services on their own. Approximately half of the study sample (49%, n=98) let their younger family members, namely son and daughter-in-law (35%, n=71) or daughter and son-in-law (13.5%) organize their health care appointments. Part of the sample received health care via their spouses' (12.5%, n=25), or friends' (9%, n =18) assistance.

The possible scores on perceived control ranged from 0 to 48. The overall average total score for the study sample was 25.95 (SD=11.09, range=0-48). For

research sake, the current thesis divided this construct into selective control and compensatory control. The average score for selective control was 12.76 (SD=6.71, range=0-24) and for compensatory control 13.22 (SD=5.45, range=0-24). Responses (by percentage) on perceived control are shown in Table 8.

4.1.5 Utilization of Each Health Care Service Examined

This section presents the self-reported health care utilization among the study sample. Due to PD, 47% (n=94) of the participants visited their doctors in medical centers and 48% (n=96) in regional hospitals. The majority of participants (86%) consulted a specific physician as their PD specialist.

Results indicated the following clinical departments were utilized with high frequency: neurology medicine (93.5%, n=187), internal medicine (40%, n=80), orthopedics (23.5%, n=47), urology departments (21.5%, n=43), gastric & intestine (16%, n=32) and ophthalmology (14%, n=28).

Of the total sample of 200 respondents, 22.5% (n=45) had visited ER and 31.5% (n=63) had used hospitalization services during the two previous years. In the three months immediately prior to questioning, 25.5% (n=51) had used REHAB, 32% (n=64) alternative treatments and around 43% (n=86) reported consuming supplemental health food. Supportive devices had been utilized by over half (55.5%, n =111) of the participants. Moreover, OPD (nearly 70%, n=138) was the most utilized health care service, followed by CIPRS (62.5%, n=125).

Regarding of care issues, 23% (n=46) became help from their foreign domestic workers; nearly half of the study sample (48%, n=96) were cared for by at least one constant informal family care-giver. Formal social care was least utilized; merely 7%

(n=14) of the participants received social care services. The self-reported utilization of health care services is outlined in Table 9.

To conclude, out-patient services were indicated as the most utilized ones, followed by CIPRS, supportive devices, family care and supplemental health food. The utilization of social care services and rehabilitation services was found to be low.

4.1.6 Correlations between Health Care Services

At this point, correlations between utilization behaviors need to be taken into consideration. Spearman's correlation rank analyses found low ($0<|r|<0.3$) to moderate ($0.3<|r|<0.7$) correlations between some of them. Take the utilization of hospitalization services, for example: it was found to be significantly correlated with almost all kinds of health care services, excluding OPD and social care services.

Secondly, OPD visits were found to be negatively correlated with the utilization of CIPRS and social care. This result suggested participants who paid more visits to outpatient departments used the prescription refill slips and social care services significantly less than their counterparts.

Furthermore, the utilization of foreign domestic workers was found to be negatively associated with the utilization of social care, but positively with family care. In other words, those who employed foreign domestic workers tended to use more family care, but less social care services. Above-mentioned correlation coefficients (Spearman's rho) are illustrated in Table 10.

4.2 Findings of Logistic Regression Modeling

To assess the relationship between the study variables and the utilization of each

health care service examined in the current thesis, univariate statistics and tests at multivariable levels were conducted. The findings of the univariate statistics were used as a reference link to the further analyses, and are therefore not presented here. Due to the dichotomous characteristics of the dependent variable in the framework A, a series of logistic regression analyses was undertaken to determine odds ratios, 95% confidence intervals and to explore relevant risk factors. As mentioned in *Section 3.5.1*, multicollinearity can lead to bias results while carrying out logistic regressions, hence tests such as correlation checks and VIF tests are conducted prior to the major procedures. The findings of logistic regression are presented in *Sections 4.2.2* to *4.2.4*. A summary of results is included in this chapter as well.

4.2.1 Multicollinearity Diagnostics

As mentioned earlier, logistic regression demands several assumption checks. Based on the results of the multicollinearity tests, as shown in Table 11 and Table 12, high correlations were revealed between need variables and selective and compensatory control, respectively, with coefficient statistics greater than .70. These statistics suggest violations of the assumptions of logistic regression and a subsequent bias in the form of variance inflation (Tabachnick & Fiedell, 2007).

For instance, when the initial twenty independent variables inherent in the framework A were entered into the logistic regression procedures to explore the utilization of hospitalization services, a problem was revealed in the form of the high correlation between disease severity and other need variables, and also between the psychological variables addressing perceived control. Based on the multicollinearity tests, as shown in Table 13, disease severity (HY stage) had a tolerance of .10 and a VIF of 9.62, followed by disease duration (tolerance=.16, VIF=6.33), IADL (tolerance=.17,

VIF=6.00) and ADL (tolerance=.17, VIF=5.93), whilst selective control hat a tolerance of .17 and a VIF of 6.04. As aforementioned in *Section 3.5.1*, tolerance values approaching zero (<.02) and VIF values exceeding the threshold value of 5 are an indication of multicollinearity (Urban & Mayerl, 2006).

It should be noted that VIF tests were undertaken on all the diverse kinds of health care utilization examined in this study with dichotomous characteristics. Principally, the findings indicated that the complete model violated the assumption of logistic regression concerning the issue of multicollinearity. Hence a decision was made to omit three variables, including disease severity, disease duration and IADL from the logistic regressions, because the remaining need variables inherent in the reduced model would be ADL and co-morbidity, presenting the functional status on the one hand, and the health status of the participants on the other. In addition, as shown in Table 11, a relatively high correlation was observed between selective and compensatory control (r=.84). Given the high VIF values and their significant correlations, this study decided to enter these two variables separately into the equation.

To close, as illustrated in Table 14, the multicollinearity tests recommended two reduced regression models constructing with sixteen variables for the further analyses. Subsequently, these models were to be tested firstly by entering six predisposing variables (e.g., gender, age, education level, marital status, number of children and living arrangement), secondly by including three enabling variables (e.g., household expenditure, ownership of handicapped ID and social support), thirdly two need predictors (ADL and co-morbidity), then fourthly and finally five psychological variables in the last regression step, including disease-related knowledge, social welfare related knowledge, attitudes towards health care, the social norms and selective control

(or compensatory control). It can thus be determined at which point effects are explained away by other effects in predicting the utilization of each service examined.

Given that there were slight differences in the prediction success among the reduced models, it was decided to report models with the better effect size in relation to the utilization of each single health care service. For brevity, only findings from the final models are presented below.

4.2.2 Risk Factors for the Utilization of Out-Patient Services, Emergency Rooms, Hospitalization Services, Chronic Illness Prescription Refill Slips and Rehabilitation

4.2.2.1 Risk Factors for the Utilization of Out-Patient Services

As illustrated in Table 15 and Table 16, the second reduced model indicated a slight improvement in prediction success. This model accounted for 16.8% (Cox and Snell R^2) or 23.6% (Negelkerke R^2) of the variance in the utilization of OPD services and was a good fit to the data, with the Hosmer and Lemeshow Chi-Square test being non-significant, χ^2 (8, N=200)=4.087, p=.849. According to the Wald criterion, age was the strongest risk factor.

The final regression procedure indicated age (OR=.894, 95%CI=.838-.954, p=.001), the number of children (OR=1.328, 95%CI=1.012-1.743, p=.041) and disease-related knowledge (OR=.744, 95%CI=.563-.984, p=.038) as significant risk factors for the utilization of out-patient services. Table 16 presents the results of the logistic regression analysis on this model.

In detail, the odds ratios greater than one for the number of children indicated that for each one-unit increase in this variable the likelihood of using OPD services increased by 32.8%. In other words, participants with more children were approximately

1.33 times more likely to make OPD visits than their counterparts.

Conversely, the odds ratios less than one for age and disease-related knowledge indicated that the odds of using OPD services decreased for each one-unit increase in age and disease-related knowledge. A one-unit increase in scores of these two variables decreased the chances of utilizing out-patient services by 10% and 15% respectively. Notably, younger participants and those with higher levels of disease-related knowledge were less likely to use out-patient services than their counterparts.

To summarize, back to the modified model of this study, the final regression results showed that predictors were derived from the predisposing and psychological characteristics. After adjustment for all variables, age, the number of children and disease-related knowledge were indicated as being the risk factors relevant to the utilization of out-patient services.

4.2.2.2 Risk Factors for the Utilization of Emergency Rooms

As illustrated in Table 17 and Table 18, the first reduced model achieved a slight improvement in prediction success. This model accounted for 32.1% (Cox and Snell R^2) or 48.8% (Negelkerke R^2) of the variance in the utilization of emergency rooms and was a good fit to the data, with the Hosmer and Lemeshow Chi-Square test being non-significant, χ^2 (8, N=200)=8.806, p=.359. According to the Wald criterion, the number of children was the strongest risk factor.

The final regression step identified female (OR=.339, 95%CI=.116-.988, p=.047), the number of children (OR=1.621, 95%CI=1.143-2.299, p=.007), ADL (OR=.971, 95%CI=.949-.993, p=.010) and the social norms (OR=7.506, 95%CI=1.087-45.809, p=.041) as significant risk factors for the utilization of emergency rooms. Table 18

presents the results of the logistic regression analysis on this model.

In detail, the odds ratios greater than one for the number of children and the social norms indicated that for each one-unit increase in these variables the likelihood of using emergency rooms increased by 62.1% and 651% respectively. In other words, those with more children were 1.62 times more likely to use emergency rooms than their counterparts. Particularly, those who did not arrange health care services on their own were approximately 7.5 times more likely to use emergency rooms than their counterparts. The social norms played a decisive role as a risk factor in relation to the utilization of emergency rooms.

Conversely, the odds ratios less than one for female and ADL indicated that a one-unit increase in scores of these two variables decreased the chances of utilizing emergency rooms by 66% and 3% respectively. These findings suggested that female participants were less likely to use emergency rooms than males and those with high levels of functional abilities were slightly less likely to use ER than their counterparts with increasing ADL limitations.

To summarize, back to the modified model of this study, the final regression results showed that predictors derived from the predisposing, need and psychological characteristics. After adjustment for all variables, gender, the number of children, ADL and the social norms were indicated as risk factors concerning the utilization of ER.

4.2.2.3 Risk Factors for the Utilization of Hospitalization Services

As illustrated in Table 19 and Table 20, the first reduced model achieved a slight improvement in prediction success. With a good fit to the data, χ^2 (8, N=200)=11.009, p=.201, this model accounted for 36.5% (Cox and Snell R^2) or 51.5% (Negelkerke R^2)

of the variance in the utilization of in-patient stay service. According to the Wald criterion, ADL is suggested to be the only significant predictor for the utilization of hospitalization services.

The final regression procedure indicated ADL (OR=.952, 95%CI=.930-.975, p<.001) as significant risk factor for the utilization of hospitalization services. Table 19 presents the results of the logistic regression analysis on this model.

The odds ratio less than one for ADL indicated that the odds of using hospitalization services decreased for each one-unit increase in ADL. A one-unit increase in scores of this variable decreased the chances of utilizing hospitalization by approximately 5%. Those with higher levels of ADL scores were indicated to be less likely to use in-patient stay services than those who had more limitations with ADL.

To summarize, returning to the modified model of this study, the final regression results showed that one need variable was found that has prediction success. After adjustment for all variables, ADL was indicated as the only risk factor addressing the utilization of hospitalization services.

4.2.2.4 Risk Factors for the Utilization of Chronic Illness Prescription Refill Slips

As illustrated in Table 21 and Table 22, the second reduced model achieved a slight improvement in prediction success, accounted for 35.1% (Cox and Snell R^2) or 47.8% (Negelkerke R^2) of the variance in the utilization of CIPRS and was a good fit to the data, with the Hosmer and Lemeshow Chi-Square test being non-significant, χ^2 (8, N=200)=12.657, p=.124. According to the Wald criterion, disease-related knowledge is indicated as the only significant predictor addressing the utilization of prescription refill slips.

The final regression procedure identified disease-related knowledge (OR=1.415, 95%CI=1.073-1.866, p=.014) as significant risk factor concerning the utilization of prescription refill slips. Table 22 presents the results of the logistic regression analysis on this model.

In detail, the odds ratio greater than one for disease-related knowledge suggested that for each one-unit increase in this variable the likelihood of using CIPRS increased by 41.5%. In other words, those with higher levels of disease-related knowledge were approximately 1.5 times more likely to use prescription refill slips than their counterparts.

To summarize, back to the modified model of the present study, the final regression results suggested one psychological variable with prediction success. After adjustment for all variables, disease-related knowledge is indicated as the only risk factor concerning the utilization of CIPRS.

4.2.2.5 Risk Factors for the Utilization of Rehabilitation Services

As illustrated in Table 23 and Table 24, the second reduced model achieved a slight success in prediction power. This model accounted for 34.9% (Cox and Snell R^2) or 51.2% (Negelkerke R^2) of the variance in the utilization of REHAB services and was a good fit to the data, with the Hosmer and Lemeshow Chi-Square test being non-significant, χ^2 (8, N=200)=4.461, p=.813. According to the Wald criterion, living arrangements was the strongest risk factor.

The final regression procedure indicated living arrangements (OR=14.325, 95%CI=3.078-66.659, p<.001), ADL (OR=.969, 95%CI=.948-.991, p=.006), social welfare related knowledge (OR=1.513, 95%CI=1.151-1.989, p=.003) and the social

norms (OR=5.570, 95%CI=.563-.984, p=.027) as significant risk factors for the utilization of rehabilitation services. Table 24 presents the results of the logistic regression analysis on this model.

In detail, the odds ratios greater than one for institutionalized and social welfare related knowledge indicated that the institutionalized participants were approximately 16 times more likely to use REHAB than the community-dwelling ones. Furthermore, those with higher levels of social welfare knowledge were 1.5 times more likely to use REHAB than their counterparts.

Conversely, the odds ratios less than one for ADL and the social norms indicated that the odds of using REHAB services decreased for each one-unit increase in ADL and the social norms. A one-unit increase in scores of these two variables decreased the chances of utilizing rehabilitation services by 3% and 25% respectively. The participants with higher levels of daily living activity were slightly less likely to use rehabilitation than those ones with limitations on the activities of daily living. Furthermore, those who did not arrange health care services on their own were significantly less likely to use rehabilitation services than their counterparts.

To summarize, returning to the modified model of this study, the final regression results showed that predictors derived from the predisposing, need and psychological characteristics. After adjustment for all variables, living arrangements, ADL, social welfare related knowledge and the social norms were indicated to be the risk factors relevant to the utilization of rehabilitation services.

4.2.3 Risk Factors for the Utilization of Alternative Therapies, Supportive Devices and Supplemental Health Food

4.2.3.1 Risk Factors for the Utilization of Alternative Therapies

As illustrated in Table 25 and Table 26, the second one achieved slight success in effect size. This model accounted for 29.3% (Cox and Snell R^2) or 41.4% (Negelkerke R^2) of the variance in the utilization of alternative therapies and was a good fit to the data, with the Hosmer and Lemeshow Chi-Square test being non-significant, χ^2 (8, N=200)=8.748, p=.364. According to the Wald criterion, co-morbidity was suggested to be the strongest risk factor.

The final regression procedure indicated social support (OR=.891, 95%CI=.962-1.002, p=.049), co-morbidity (OR=1.392, 95%CI=1.041-1.862, p=.026) and the social norms (OR=.744, 95%CI=.563-.984, p=.038) as significant risk factors for the utilization of alternative therapies. Table 26 presents the results of the logistic regression analysis on this model.

In detail, the odds ratio greater than one for co-morbidity indicated that for each one-unit increase in this variable the likelihood of using alternative therapy increased by 39.2%. In other words, participants with higher levels of co-morbidity were approximately 1.4 times more likely to use alternative therapies than those with fewer health issues.

Conversely, the odds ratios less than one for social support and the social norms indicated that the odds of using alternative therapies decreased for each one-unit increase in social support and the social norms. A one-unit increase in the scores of these two variables decreased the chances of utilizing alternative therapies by 10% and 25% respectively. Those received more social support and those who did not arrange health care appointments on their own were less likely to use alternative therapies than their counterparts.

Particularly, it is necessary to mention that household expenditure turned out to be significant in the first reduced model. In other words, while considering the role of selective control in the overall framework, as in Table 25, household expenditure is indicated to be a risk factor with the odds ratios of 1.569 (95%CI=1.004-2.452, p=.048), next to social support, co-morbidity and the social norms. In other words, those with higher levels of household expenditure were approximately two times more likely to use alternative therapies than their counterparts.

To summarize, back to the modified model of this study, the final regression results showed that predictors derived from the enabling, need and psychological characteristics. After adjustment for all variables, social support, co-morbidity and the social norms were indicated to be risk factors addressing the utilization of alternative therapies. Specifically, in the presence of selective control, household expenditure turned out to be a risk factor.

4.2.3.2 Risk Factors for the Utilization of Supportive Devices

As illustrated in Table 27 and Table 28, the first reduced model achieved slight success in effect size. This model accounted for 34.8% (Cox and Snell R^2) or 53.4% (Negelkerke R^2) of the variance in the utilization of supportive devices and was a good fit to the data, with the Hosmer and Lemeshow Chi-Square test being non-significant, χ^2 (8, N=200)=10.706, p=.219. According to the Wald criterion, age was the strongest risk factor.

The final regression analysis indicated age (OR=1.183, 95%CI=1.084-1.290, p<.001), ADL (OR=.963, 95%CI=.933-.994, p=.018), co-morbidity (OR=1.737, 95%CI=1.154-2.613, p=.008), social welfare related knowledge (OR=1.760, 95%CI=1.257-2.462, p=.001) and selective control (OR=.802, 95%CI=.682-.942,

p=.007) as the significant risk factors.

In detail, the odds ratios greater than one for age, co-morbidity and social welfare related knowledge indicated that those at more advanced age, those having higher levels of chronic disorders and those with higher levels of social welfare knowledge were 1.2 to approximately 2 times respectively more likely to use supportive devices than their counterparts.

Conversely, the odds ratios less than one for ADL and selective control indicated that a one-unit increase in scores of these two variables decreased the chances of utilizing supportive devices by 3% and 20% respectively. In other words, those with high levels of functional abilities in their everyday's life and those with high levels of selective control were less likely to use supportive devices than their counterparts.

To summarize, returning to the modified behavioral model, final regression results suggested that predictors derived from the predisposing, need and psychological characteristics. After adjusting for all variables that contributed to the outcome variable, age, ADL, co-morbidity, social welfare related knowledge and selective control were suggested as the risk factors for the utilization of supportive devices.

4.2.3.3 Risk Factors for the Utilization of Supplemental Health Food

As illustrated in Table 29 and Table 30, the first reduced model showed a slight improvement in prediction success. This model accounted for 28.7% (Cox and Snell R^2) or 38.4% (Negelkerke R^2) of the variance in the utilization of supplemental health food and was a good fit to the data, with the Hosmer and Lemeshow Chi-Square test being non-significant, χ^2 (8, N=200)=2.408, p=.966. According to the Wald criterion, gender was the strongest risk factor.

The final regression analysis indicated attitudes towards health care (OR=1.316, 95%CI=1.064-1.628, p=.011), next to female (OR=2.999, 95%CI=1.294-6.951, p=.010), age (OR=1.070, 95%CI=1.007-1.137, p=.029), the number of children (OR=.697, 95%CI=.531-.913, p=.009) and co-morbidity (OR=1.326, 95%CI=1.008-1.743, p=.043) as significant risk factors for the utilization of health food. Table 29 presents the results of the logistic regression analysis on this model.

In detail, female, age, co-morbidity and attitudes towards health care hat odds ratios greater than one. These finding indicated that females were 3 times more likely to use health food than males. Those with more co-morbid conditions, ones having more positive attitudes towards health care were approximately 1.5 times more likely to consume health food than their counterparts.

Conversely, the odds ratio less than one for the number of children suggested that a one-unit increase in score of this variable decreased the chances of utilizing supplemental health food by 30%. In other words, those with more children were less likely to consume health food than their counterparts.

To summarize, back to the modified behavioral model, final regression results suggested that predictors derived from the predisposing, need and psychosocial characteristics. After adjusting for all variables that contributed to the outcome variable, gender, age, the number of children, co-morbidity and attitudes towards health care were indicated as the risk factors concerning the utilization of supplemental health food.

4.2.4 Risk Factors for the Utilization of Family Care, Foreign Domestic Workers and Social Care Services

4.2.4.1 Risk Factors for the Utilization of Family Care

As illustrated in Table 31 and Table 32, the second reduced model indicated a slight improvement in prediction success. This model accounted for 34.3% (Cox and Snell R^2) or 50.9% (Negelkerke R^2) of the variance in the utilization of family care and was a good fit to the data, with the Hosmer and Lemeshow Chi-Square test being non-significant, χ^2 (8, N=200)=10.908, p=.207. According to the Wald criterion, ADL is indicated to be the only significant risk factor for the utilization of family care.

The final regression analysis indicated ADL (OR=.943, 95%CI=.917-.970, p<.001) as the only one significant risk factor for the utilization of family care. Table 32 presents the results of the logistic regression analysis on this model.

Addressing the odds ratio less than one for ADL, it is to mention that a one-unit increase in the ADL score decreased the chances of utilizing family care by 5%. In other words, those with higher levels of daily living skills were less likely to use family care than those with increasing ADL limitations.

To summarize, one need variable was found with prediction success in this model. After adjusting for all variables that contributed to the outcome variable, ADL was identified as the only risk factor for the utilization of family care.

4.2.4.2 Risk Factors for the Utilization of Foreign Domestic Workers

As illustrated in Table 33 and Table 34, the second reduced model, achieving a slight improvement in prediction success, accounted for 49.9% (Cox and Snell R^2) or 76.6% (Negelkerke R^2) of the variance in the utilization of foreign domestic workers. However no goodness-of-fit was found inherent this model, because it violated the assumptions of logistic regression, with the Hosmer and Lemeshow statistic, χ^2 (8, N=200)=59.004, p=.000, less than .05. Hence the fist reduced model was tested by the

differences in χ^2. No models were found with appropriate statistics indicating a good fit to the data.

To summarize, addressing the utilization of foreign domestic workers, no model could be conducted without violations of assumptions demanded by the logistic regression.

4.2.4.3 Risk Factors for the Utilization of Social Care Services

As illustrated in Table 35 and Table 36, the first reduced model, achieving a slight improvement in prediction success, accounted for 27.2% (Cox and Snell R^2) or 45.5% (Negelkerke R^2) of the variance in the utilization of social care services and was a good fit to the data, with the Hosmer and Lemeshow Chi-Square test being non-significant, χ^2 (8, N=200)=.451, p=1.00. According to the Wald criterion, social welfare related knowledge was the strongest risk factor.

The final regression procedure indicated marital status (OR=27.895, 95%CI=1.323-17.936, p=.032), social support (OR=.801, 95%CI=.644-.955, p=.045), ADL (OR=1.072, 95%CI=1.002-1.048, p=.044) , co-morbidity (OR=2.503, 95%CI=1.057-5.927, p=.007), social welfare related knowledge (OR=2.934, 95%CI=1.348-6.486, p=.038) and attitudes towards health care (OR=.372, 95%CI=.174-.795, p=.011) as the significant risk factors for the utilization of social care services. Table 35 presents the results of the logistic regression analysis on this model.

In detail, the odds ratios greater than one for ADL, co-morbidity and social welfare related knowledge indicated that those with higher levels of functional skills in everyday's life, those having more co-morbid conditions and those with higher levels of social welfare related knowledge were approximately 1.1, 2.5 and 3 times more likely to

use social care services than their counterparts. Particularly, those who were not married (widowed, single etc.) were approximately 28 times more likely to use formal care.

Conversely, the odds ratios less than one for social support and attitudes towards health care indicated that a one-unit increase in scores of these two variables decreased the chances of utilizing social care services by 20% and 62% respectively. Those receiving more social support and those with higher levels of positive attitudes towards health care were less likely to use social care than their counterparts.

To summarize, back to the modified behavioral model, predictors addressing the utilization of social care services derived from the four model components. After adjusting for all variables that contributed to the outcome variable, marital status, social support, ADL, co-morbidity, social welfare related knowledge and attitudes towards health care were identified as the risk factors, whether social care services were used or not.

4.2.5 Summary of Main Findings

4.2.5.1 Descriptive Analysis

This chapter started with a descriptive analysis and presented further findings determining predictor variables concerning the utilization of each single health care service. 52% of the participants were male. The majority was married and lived in a 3-generation household. The study sample had a mean age of 75.07 years with 3.16 children on average. In regard to PD, subjects were moderately affected, with an average Hoehn and Yahr stage of 2.49 and an average ADL score of 73.17. Besides, 24.5% reported themselves to be in possession of handicapped ID.

In respect of the utilization, OPD (69%) was reported to be the most used service,

followed by CIPRS (62.5%), supportive devices (55.5%), family care (48%) and supplemental health food (43%). A remarkable percentage (23%) of the participants received informal care offered by foreign domestic workers. Formal social care services (7%) were least used.

4.2.5.2 Logistic Regression

Regarding the utilization of each health care service examined in this study, results of logistic regression indicated need level to be the most significant component in the proposed framework A, followed by psychological, predisposing and enabling characteristics. Hence a résumé is given in this order of rank.

(1) Need

ADL is indicated as the most significant risk factor. Emergency rooms, hospitalization services, rehabilitation services, supportive devices and family care were less likely to be used by participants with higher levels of daily living skills. An exception was found addressing the utilization of social care services. Evidence suggested that those with higher ADL scores were rather more likely to use social care services.

Furthermore, co-morbidity was found to predict positively the utilization of alternative therapies, supportive devices, health food and social care services.

(2) Psychological Characteristics

The social norms and social welfare related knowledge were suggested to be significant, followed by attitudes towards health care, disease-related knowledge and selective control.

Firstly, the social norms acted as a risk factor in relation to the utilization of

emergency rooms, rehabilitation services and alternative therapies. In detail, those who did not arrange health care services on their own were more likely to use emergency rooms than their counterparts, however these individuals were less likely to utilize rehabilitation services and alternative therapies.

Social welfare related knowledge was found to be a risk factor concerning the utilization of rehabilitation services, supportive devices and social care. These three services were more likely to be used by participants having higher levels of social welfare related knowledge.

Furthermore, disease-related knowledge was indicated to predict the utilization of out-patient services and CIPRS. Those with higher levels of disease-related knowledge were more likely to use CIPRS, however less likely to use out-patient services than their counterparts. It is to be noted that disease-related knowledge was the only risk factor predicting the utilization of CIPRS.

Attitudes towards health care were found to be a risk factor for the utilization of supplemental health food and social care. Those with higher levels of positive attitudes towards health care were more likely to consume health food, however less likely to utilize social care services than their counterparts.

Finally, selective control was suggested to predict the utilization of supportive devices. Those with higher levels of selective control were less likely to use supportive devices than their counterparts.

(3) Predisposing Characteristics

Among the predisposing variables, age was indicated as the most significant predictor, followed by gender, the number of children, marital status and living

arrangements.

Firstly, age was found to positively predict the utilization of supportive devices, health food and family care. Those at an advanced age were more likely to use the aforementioned services than the younger ones. On the other hand, evidences indicated that those with increasing age were less likely to use out-patient services.

Gender was found to be a risk factor for the utilization of emergency rooms and health food. In detail, females were more likely to consume supplemental health food than males, whereas emergency rooms were less likely to be used by female participants than by male ones.

Furthermore, those having more children were more likely to use ambulatory out-patient services, however less likely to consume supplemental health food than their counterparts.

Finally, those who were not married at the time of the investigation were more likely to use social care than married ones. Institutionalized participants were more likely to use rehabilitation services than community-dwelling older adults with PD.

(4) Enabling Resources

Social support was found to be able to predict the utilization of alternative therapy and social care. Those receiving higher levels of social support were less likely to use the aforementioned services than their counterparts.

Household expenditure was found to be a risk factor for the utilization of alternative therapies. Those having higher levels of household expenditure were more likely to use alternative therapy than their counterparts. It is to be observed that enabling variables played an important role in the utilization of alternative therapies. Significant

risk factors in relation to the utilization of each examined health care service are illustrated in Table 37.

4.3 A More Complex View of Relationships among Key Variables: Findings of Path Analysis

4.3.1 Zero-Order Correlations

Path analyses, assessing the utilization of medical services, care services, CAM and overall health care utilization, are conducted in this chapter to explore the contribution of the four main components inherent in the study framework A.

Firstly, due to the limitation of the LISREL program, nominal variables such as gender, marital status, living arrangements, ownership of handicapped ID and the social norms are excluded from the path analysis. Secondly, prior to the model testing, the dataset was evaluated for the assumptions of path analysis. As shown in Table 38, zero-order correlations conducted among the initial study variables and the utilization of medical services revealed several significant relationships with correlation coefficients greater than .70: ADL correlated with IADL at r=.85 ($p<.01$), with disease duration at r=.-78 ($p<.01$) and with disease severity at r=.-86 ($p<.01$). IADL correlated with disease duration at r=-.77 ($p<.01$) and with disease severity at r=-.84 ($p<.01$). Disease duration correlated with disease severity at r=.90 ($p<.01$). Selective control correlated with compensatory control at r=.85($p<.01$). In addition, VIF testes indicated a high multicolinearity between these variables.

Hence variables such as disease severity, disease duration and IADL were omitted from the path analysis. Table 39 outlines the zero-order correlations among the study variables testing the utilization of medical services. Notably, all the zero-order correlations affecting this chapter were conducted. Results revealed that the variance

inflation factors of the reduced variable set were less than a VIF threshold of 5, indicating that there was no multicolinearity issue among the remaining variables. The relevant statistics are presented in Appendix C (see Table C1-C7). Models testing the health care utilization are presented below.

4.3.2 Model Testing the Utilization of Medical Services

4.3.2.1 Model Fit

Regarding the utilization of medical services, the initial fit statistics of the structural model were improper, χ^2(df=12, n=200)=77.95, p=.000, RMSEA=.167. The modification indices suggested adding error covariance between ADL and co-morbidity. The addition performed a proper solution also, with χ^2(df=7, N=200) of 14.18 (p=.048, NIF=.962, GIF=.983, RMSEA=.043), indicating that the final model fitted the data.

4.3.2.2 Total Effects

As shown in Table 40, the model indicated that one predisposing, one need and one psychological variable had significant total effects on the utilization of medical services.

ADL (ß=-.593, p<.001) revealed the most significant total effect. Those with higher levels of daily living activity were less likely to use medical services than their counterparts with poorer ADL scores. Age (ß=-.079, p<.05) linked negatively to the outcome variable as well, however with a less significant effect. Moreover, attitudes towards health care (ß=.126, p<.05) played an important role regarding the utilization of medical services. Those having more positive attitudes made significantly more use of medical services. Finally, education level was not linked to the outcome variable directly, but with a significant negative indirect effect.

Additionally, predisposing variables were indicated to have total effects on enabling, need and psychological measures, respectively. One need variable was found

to have a positive effect on psychological variables. In detail, age was strongly negatively linked to ADL (ß=-.335, p<.001), yet positively related to co-morbidity (ß=.479, p<.001). Besides, age had a total effect on social welfare related knowledge (ß=-.201, p<.01), selective control (ß=-.022, p<.05) and attitudes (ß=.118, p<.01) respectively. This means that being older was associated with having positive attitudes towards health care, whereas participants at more advanced age were less likely to have high levels of selective control and social welfare related knowledge.

Furthermore, education level had a positive total effect on ADL (ß=.235, p<.001) and a negative one on co-morbidity (ß=-.234, p<.001). This model construct was linked significantly to three psychological variables. Evidences supported that those having higher levels of education were more likely to have welfare related knowledge (ß=.351, p<.001), selective (ß=.384, p<.05) and compensatory control (ß=.162, p<.05).

The number of children, with no total effect on the outcome variable, was positively linked to social support (ß=.234, p<.01), yet negatively to welfare related knowledge (ß=-.123, p<.05). This finding revealed that those with more children were more likely to have social support, but less likely to be aware of social welfare services.

Finally, the paths linking ADL (ß=.318, p<.001) to selective control revealed to be significant. In other words, those with higher levels of daily living activities were more likely to have selective control than their counterparts with less functional abilities.

4.3.2.3 Indirect Effects

As outlined in Table 41, the model revealed that predisposing variables such as age (p<.001) and education (p<.05) had an indirect effect on the utilization of medical services. Age was linked to the outcome variable through ADL and attitudes. For

example, participants at a more advanced age were more likely to perform less functional skills in daily living, those with lower ADL scores were more likely to use medical services than their counterparts. Specifically, those at a more advanced age were more likely to have positive attitudes towards health care, ones having more positive attitudes towards health care were more likely to use medical services than their counterparts.

The indirect effect of the education level on the outcome variable appeared to operate through ADL. Participants having higher levels of education were more likely to have functional skills in their everyday's life, those with higher ADL scores were less likely to use medical services.

Furthermore, three paths with indirect effects were suggested. The predisposing variables such as age and education level had an indirect effect on selective control and attitudes respectively. These appeared to operate through ADL. To conclude, the indirect effects on the utilization of medical services operated generally through ADL and attitudes towards health care. A detailed diagram presenting all significant paths inherent this model is illustrated in Figure 9.

4.3.3 Model Testing the Utilization of CAM

4.3.3.1 Model Fit

Assessing the utilization of CAM, the initial estimation of the model resulted in a less satisfactory fit to the data, with χ^2=77.30, df=12, p=.0000, RMSEA=.166. According to the modification index, error covariance between ADL and co-morbidity was added to the initial model. The addition included acceptable values of the fit index, χ^2=14.68, df=11, p=.198, RMSEA=.041, NIF=.961, GIF=.981, were all within the range of adequate fit.

4.3.3.2 Total Effects

As presented in Table 42, the model indicated one need variable as significant. Co-morbidity (ß=.314, p<.01) was linked to the outcome variable positively. In other words, higher levels of co-morbidity were associated with higher use of CAM. Additionally, age was suggested to have an indirect effect on the outcome variable (p<.05). Age and education revealed total effects on enabling, need and psychological measures. ADL (p<.001) was also found to have a total effect on selective control. Similar findings were discussed previously.

4.3.3.3 Indirect Effects

As outlined in Table 43, there were four indirect effects revealed in this model. Age (p<.001) had an indirect effect on the utilization of CAM. This appeared to operate through co-morbidity. Those at a more advanced age were more likely to have co-morbid issues, those having higher levels of co-morbidity tended to be more likely to use CAM.

In addition, age and education level were indicated to have an indirect effect on selective control. This was assumed to operate through co-morbidity. Age was also found to have an indirect effect on attitudes towards health care. Taken as a whole, the indirect effects operated primarily through co-morbidity. This path model is illustrated in Figure 10.

4.3.4 Model Testing the Utilization of Care Services

4.3.4.1 Model Fit

Regarding the utilization of care services, the initial model presented a poor-fitting solution, with $\chi^2(12, n=200)=76.73$, p=.000, RMSEA=.165. The modification indices

suggested a relationship between ADL and co-morbidity. Relevant error covariance was subsequently added to the initial model. The addition revealed an improved χ^2 (df=11, n=200) of 14.11 (p=.227, NIF=.973, GIF=.987, RMSEA=.038,), indicating that the final model fitted the data.

4.3.4.2 Total Effects

As shown in Table 44, two predisposing variables, one need and two psychological variables had a significant total effect on the utilization of care services. Specifically, this model revealed the important role of selective control (ß=-.215, p<.05) and compensatory control (ß=-.116, p<.05) in regard to the utilization of care services. Participants with higher levels of selective and compensatory were less likely to use care services than their counterparts.

Furthermore, a strong relationship between ADL (ß=-.405, p<.001) and the outcome variable was proved. Those with higher levels of ADL scores were less likely to use care services. Conversely, participants at a more advanced age (ß=.227, p<.001) and those with higher levels of education (ß=.068, p<.05) were more likely to use care services than their younger counterparts and ones with lower levels of education.

4.3.4.3 Indirect Effects

As shown in Table 45, this model revealed six paths with indirect effects. Education level (p<.001) had a strong indirect effect on the utilization of care services, followed by age (p<.001) and ADL (p<.05).

Firstly, the indirect effect of education level on the outcome variable appeared to operate through ADL and selective control, respectively or through ADL and selective control together. For instance, those with higher levels of education were more likely to

have functional skills in the daily living, those with higher ADL scores were less likely to use care services. Or those with higher levels of education were more likely to perform ADL well, those with higher levels of ADL scores were more likely to have selective control and finally those with higher levels of selective control were less likely to use care services.

The indirect effect of age on the outcome variable appeared to operate through ADL and selective control. The indirect effect of ADL was assumed to operate through selective control. Taken as a whole, the indirect effects operated through ADL and selective control. This model is presented Figure 11.

4.3.5 Model Testing the Overall Health Care Utilization

4.3.5.1 Model Fit

Regarding overall health care utilization, the initial estimation of the model revealed an improper fit to the data, with χ^2=77.27, df=12, p=.0000, RMSEA=.166. According to the modification indices, error covariance between ADL and co-morbidity was added into the model. The result indicated acceptable values of the fit index, χ^2=14.65, df=11, p=.199, NIF=.969, GIF=.985, RMSEA=.041, suggesting the model fitted the data.

4.3.5.2 Total Effects

As presented in Table 46, one need variable had a significant total effect on health care utilization in its entirety. Higher levels of co-morbidity (ß=.323, p<.001) were linked to a higher use of the examined health care services overall.

4.3.5.3 Indirect Effects

As shown in Table 47, the model revealed four paths with indirect effects. Age

($p<.001$) was suggested to have an indirect effect on overall health care utilization. This operated through co-morbidity. Furthermore, both age and education level had an indirect effect on selective control. This operated through co-morbidity as well. Age was also found to have an indirect effect on attitudes towards health care. This path model is presented in Figure 12.

4.3.6 Summary

Based on the assumptions of path analysis, reduced models were constructed in *Chapter 4.3* to test the different types of health care utilization. Firstly, need was highlighted as the most significant model component in the present study. Concerning the utilization of CAM and health care utilization overall, co-morbidity was found to be the only key variable.

Furthermore, when the single services were aggregated into medical and care services, the role of psychological and predisposing components became clear. ADL, attitudes towards health care and age were linked significantly to the utilization of medical services. ADL, selective and compensatory control had negative total effects, whereas age and education level were indicated to have slight positive total effects on the utilization of care services. The findings pointed out not only the contribution of psychological characteristics to these two types of health care utilization, but also illustrated that measuring health care utilization at the 'aggregate' level is helpful in terms of exploring the various roles of the main components in the modified Andersen model.

Additionally, predisposing characteristics were indicated to have indirect effects on the relevant outcome variables. In general, these operated primarily through need and through the significant psychological variables such as attitudes towards health care,

selective and compensatory control, respectively. Need variables revealed also an indirect effect on the utilization of care services, operating through selective control.

4.4 HEALTH CARE UTILIZATION AND HEALTH-RELATED QUALITY OF LIFE

This section presents firstly the descriptive statistics of HRQOL and depressive symptoms. Path models indicating a differentiation between the four types of health care utilization in relation to depressive symptoms and HRQOL are illustrated.

4.4.1 Descriptive Analysis

SF-12 was used to measure HRQOL among the participants. The mean score for HRQOL was 31.70 (SD=10.75). Regarding both of the subscales, the mean score of the physical HRQOL (PCS) was 13.83 (SD=5.94); of the mental one (MCS) 17.85 (SD=5.10).

The instrument used for the collection of the data on depressive symptoms was GDS-15. The scores of depressive symptoms could range between 0 and 15, with higher scores indicating a greater depressive tendency. The mean GDS score for this sample was 7.21 with a standard deviation of 5.77. When the cut-off scores are set at 4, like literature suggests (Sheikh & Yesavage, 1986; Yesavage et al., 1983), 44.5% (n=89) of the study sample was found to have a depressive tendency.

4.4.2 Model Testing HRQOL, operated through the Utilization of Medical Services

4.4.2.1 Model Fit

The initial path model presented a poor-fitting solution, with $\chi^2(12, N=200)=77.70$, p=.000, RMSEA=.167. The modification indices suggested that the model fit would be improved by adding error covariance between ADL and co-morbidity. The addition

revealed an improved χ^2 (df=11, n=200) of 15.08 (p=.179, NIF=.983, GIF=.987, RMSEA=.043), indicating that the final model fitted the data.

4.4.2.2 Model Results

The total effects, indirect effects and the standardized effects of the study variables are summarized in Table 49.

(1) Total effects

As illustrated in the table, two predisposing variables, two need variable and one psychosocial variable had significant total effects on HRQOL. This model revealed the important role of selective control (ß=.277, p<.001) in regard to HRQOL. Participants with higher levels of selective control were more likely to have high levels of HRQOL than their counterparts.

Furthermore, higher functional abilities (ß=.184, p<.001) were linked to higher levels of HRQOL; and higher levels of co-morbidity (ß=-.197, p<.05) to lower HRQOL. A weak relation was indicated between age (ß=-.075, p<.001) and HRQOL, as well as between education level and HRQOL (ß=-.017, p<.01). The utilization of medical services was not significantly linked to HRQOL.

Additionally, attitudes towards health care (ß=.126, p<.05) was found to be positively associated with the utilization of medical services, whereas age (ß=-.080, p<.01) and ADL (ß=-.593, p<.001) were negatively linked to the utilization of medical services. In other words, participants with better attitudes towards health care were significantly more likely to use medical services than their counterparts. Furthermore, compared with participants at a more advanced age and those having more difficulties in activities of daily living, younger participants and those with higher levels of ADL

scores were less likely to utilize medical services. These findings were identical to results presented in *Section 4.3.2*.

As illustrated in Table 49, further paths with significant positive total effects were identified between age and co-morbidity (ß=.479, p<.001), age and attitudes towards health care (ß=.118, p<.01), education level and ADL (ß=.235, p<.001), education level and social welfare related knowledge (ß=.351, p<.001), education level and selective control (ß=.385, p<.001), education level and compensatory control (ß=.162, p<.05), the number of children and social support (ß=.234, p<.01) and ADL and selective control (ß=.320, p<.001).

Conversely, paths with negative total effects included ones between: age and ADL (ß=-.335, p<.001), age and social welfare related knowledge (ß=-.201, p<.01), age and selective control (ß=-.019, p<.01), education level and co-morbidity (ß=-.234, p<.001) and the number of children and social welfare related knowledge (ß=-.123, p<.05).

(2) Indirect effects

As shown in Table 49, this model revealed three paths linked to the outcome variable with indirect effects. Age (p<.001) and education level (p<.001) were suggested to have indirect effects on HRQOL. This appeared to operate through ADL, co-morbidity and selective control. In addition, ADL was indicated as having an indirect effect on HRQOL, operating through selective control. This path model is presented in Figure 13.

4.4.3 Model Testing HRQOL, operated through the Utilization of Medical Services and Depressive Symptoms

4.4.3.1 Model Fit

This section added depressive symptoms to the foregoing model and aimed to investigate HRQOL in relationship with population characteristics, psychological components, depressive symptoms and the utilization of medical services among older adults with PD. The initial fit statistics of the structural model were poor, χ^2=77.70, df=12, p=.000, RMSEA=.167. The modification indices suggested that the model fit would be improved by adding error covariance between ADL and co-morbidity. This addition achieved acceptable values of the fit index, χ^2=15.08, df=11, p=.179, NIF=.983, GIF=.987, RMSEA=.043.

4.4.3.2 Model Results

The total effects, indirect effects and the standardized effects of the study variables are summarized in Table 50.

(1) Total effects

As noted in the table, depressive symptoms (ß=-.550, p<.001) had notably the strongest total effects on HRQOL, followed by age (ß=-.111, p<.001), co-morbidity (ß=-.083, p<.05), education level (ß=-.074, p<.01), ADL (ß=.042, p<.001) and selective control (ß=.031, p<.001). In other words, participants having higher levels of depressive symptoms, those at a more advanced age, those with more co-morbid health issues and those with higher levels of education were less likely to have high levels of HRQOL. On the other hand, those with higher functional abilities in daily living and those with higher levels of selective control were slightly more likely to have high levels of HRQOL. In addition, the utilization of medical services was not significantly associated with HRQOL.

Besides the additional path linking depressive symptoms to HRQOL, it should be

noted that the other significant paths with total effects were generally consistent with those in the *Section 4.4.2*. Compared with the foregoing model, the current one revealed a reduction of total effects derived from selective control and ADL. This can be seen as a result of the improving indirect effects of the relevant key variables after the addition of depressive symptoms.

Additionally, with the addition of depressive symptoms into the model, ADL (ß=-.510, p<.001) and age (ß=-.062, p<.01) were found negatively related to the utilization of medical services, whereas depressive symptoms (ß=.255, p<.01) and attitudes towards health care (ß=.111, p<.05) had positive total effects on the utilization of medical services. In other words, participants with higher ADL scores, and those at a more advanced age were less likely to use medical services, while participants with higher levels of depressive symptoms and those with more positive attitudes towards health care were significantly more likely to use medical services.

Selective control (ß=-.379, p<.001), followed by ADL (ß=-.331, p<.001), compensatory control (ß=-.157, p<.01), education level (ß=-.097, p<.001) and age (ß=-.071, p<.01) were suggested to have positive total effects on depressive symptoms, whereas co-morbidity (ß=.137, p<.01) was found to be negatively linked to depressive symptoms. It is to be noted that those at a more advanced age were less likely to have high levels of depressive symptoms. This path model and all the significant paths are illustrated in Figure 14.

(2) Indirect effects

This model indicated sixteen paths with significant indirect effects, six of them were linked to HRQOL. Age (p<.01), education level (p<.001), ADL (p<.001), co-morbidity (p<.05), selective (p<.001) and compensatory control (p<.05) had

significant indirect effects on HRQOL. Specifically, these mentioned variables were indicated to have total effects on the outcome variable, compensatory control excluded. Doubtlessly, the indirect effects derived from selective and compensatory control operated through depressive symptoms. As outlined in Table 50, the other indirect effects operated through ADL, co-morbidity, selective control and depressive symptoms.

4.4.4 Model Testing HRQOL, operated through the Utilization of CAM

4.4.4.1 Model Fit

This model used the population characteristics, psychological characteristics and utilization of CAM to test HRQOL. The initial model resulted in a less satisfactory fit to the data, χ^2=77.38, df=12, p=.000, RMSEA=.166. The modification index suggested that the model fit would be improved by adding error covariance between ADL and co-morbidity. This addition showed a good fit, indicated by the chi-square value χ^2(df=11, n=200)=14.76, p=.194, NIF=.979, GIF=.983, RMSEA=.042, all within the acceptable range of adequate fit.

4.4.4.2 Model Results

The total effects, indirect effects and the standardized effects of the study variables are summarized in Table 51.

(1) Total effects

Firstly, this model proved that participants with higher levels of selective control (ß=.271, p<.001) were more likely to have high levels of HRQOL than their counterparts. Furthermore, those with higher levels of ADL scores (ß=.227, p<.001) were more likely to have high levels of HRQOL, while those with more co-morbid

health issues (ß=-.068, p<.01) were less likely to have high levels of HRQOL. Besides, age (ß=-.068, p<.001) and education level (ß=-.017, p<.05) were linked slightly negatively to HRQOL. It is to be noted that the utilization of CAM was found to have no total effect on HRQOL.

In addition, co-morbidity (ß=.314, p<.01) was associated positively with the utilization of CAM. This path model is illustrated in Figure 15.

(2) Indirect effects

This model indicated six paths with significant indirect effects. ADL (p<.05) and age (p<.05) each had an indirect effect on HRQOL. The indirect effects of age appeared to operate through ADL and selective control; the indirect effects from ADL, through selective control.

Furthermore, age was found to have an indirect effect on attitudes towards health care (p<.05), selective control (p<.001) and the utilization of CAM (p<.05). Furthermore, education was linked to selective control (p<.001) indirectly.

4.4.5 Model Testing HRQOL, operated through the Utilization of CAM and Depressive Symptoms

4.4.5.1 Model Fit

This section added depressive symptoms to the foregoing model in *Section 4.4.4* and aimed to investigate HRQOL in relationship with population characteristics, psychological characteristics, depressive symptoms and the utilization of CAM among older adults with PD. The initial fit statistics of the structural model were less adequate, χ^2=77.42, df=12, p=.000, RMSEA=.166. Based on the modification index, error covariance was added between ADL and co-morbidity. This addition achieved

acceptable values of the fit index, χ^2=14.80, df=11, p=.192, NIF=.979, GIF=.983, RMSEA=.042.

4.4.5.2 Model Results

The total effects, indirect effects and the standardized effects of the study variables within this model are presented in Table 52.

(1) Total effects

As noted in the table, depressive symptoms (ß=-.611, p<.001) had notably the strongest total effects on HRQOL. Findings suggested participants with higher levels of depressive symptoms, those at a more advanced age (ß=-.114, p<.001), those having more co-morbid health issues (ß=-.078, p<.05) and those with higher levels of education (ß=-.073, p<.01) were less likely to have high levels of HRQOL. On the other hand, ADL (ß=.024, p<.001) and selective control (ß=.040, p<.001) linked slightly positively to HRQOL. In addition, the utilization of CAM was not significantly associated with HRQOL.

Furthermore, within this model, co-morbidity (ß=-.062, p<.01) was proved to be the only variable linking significantly to the utilization of CAM. In addition, selective control (ß=-.378, p<.001) was proved to have the strongest negative total effects on depressive symptoms, followed by ADL (ß=-.334, p<.001), compensatory control (ß=-.158, p<.001), education level (ß=-.094, p<.001) and age (ß=-.075, p<.01). On the contrary, participants with higher levels of co-morbidity (ß=.137, p<.01) were more likely to have high levels of depressive symptoms. The other remaining significant paths and the entire model are illustrated Figure 16.

(2) Indirect effects

This model revealed thirteen paths with indirect effects. Six of them were linked to HRQOL, including age ($p<.01$), education level ($p<.001$), ADL ($p<.001$), co-morbidity ($p<.05$), selective ($p<.001$) and compensatory control ($p<.01$). Notably, the first five variables mentioned were linked to HRQOL both directly and indirectly. Only compensatory control was related to the outcome variable indirectly through selective control.

In general, the significant indirect paths between the above mentioned predisposing variables and HRQOL were negative and operated through ADL, co-morbidity, selective control, compensatory control and depressive symptoms. The significant indirect paths between ADL and HRQOL operated through selective control and depressive symptoms, while the indirect paths between co-morbidity and HRQOL operated merely through depressive symptoms. To conclude, the addition of depressive symptoms into the current model increased the indirect effects between the above mentioned variables and HRQOL enormously.

4.4.6 Model Testing HRQOL, operated through the Utilization of Care Services

4.4.6.1 Model Fit

This model used population characteristics, psychological characteristics and the utilization of care services to predict HRQOL among the study participants. The initial model resulted in a less satisfactory fit to the data, $\chi^2=76.92$, df=12, p=.000, RMSEA=.166. The modification index suggested that the model fit would be improved by adding error covariance between ADL and co-morbidity. This addition showed a good fit, indicated by the chi-square value χ^2(df=11, n=200)=14.30, p=.217, NIF=.983, GIF=.987, RMSEA=.039, all within the acceptable range of adequate fit.

4.4.6.2 Model Results

The total effects, indirect effects and the standardized effects of the study variables are summarized in Table 53.

(1) Total effects

Firstly, this model revealed the significance of the utilization of care services (ß=-.337, p<.001) and co-morbidity (ß=-.143, p<.05) affecting HRQOL. People who used more care services and those with higher levels of co-morbidity were less likely to have high levels of HRQOL. On the other hand, selective control (ß=.199, p<.001) and ADL (ß=.092, p<.001) were indicated to have positive effects on HRQOL. In other words, participants with higher levels of selective control and those with better functional abilities in daily living were more likely to report high levels of HRQOL.

Besides, age (ß=.012, p<.001) and education level (ß=.004, p<.01) were indicated to have a slight total effect on HRQOL as well. It should be noted that unlike the models in *Section 4.4.2* and *4.4.4*, when the utilization of care services was taken into consideration, age (ß=.037, p<.001) was found to be positively linked with HRQOL.

ADL (ß=-.406, p<.001), selective control (ß=-.209, p<.01) and compensatory control (ß=-.117, p<.05) were linked negatively to the utilization of care services. On the other hand, findings suggested that participants at a more advanced age (ß=.228, p<.001) and ones with higher levels of education (ß=.065, p<.05) were more likely to use care services. The other remaining significant paths and the entire path model are presented in Figure 17.

(2) Indirect effects

This model revealed ten paths with indirect effects. Four of them were linked to HRQOL, including age (p<.001), education level (p<.001), ADL (p<.001) and selective

control (p<.05). In general, the indirect effects of the mentioned predisposing variables on HRQOL operated through ADL and co-morbidity, selective control and the utilization of care services. The indirect effect of ADL operated then through selective control and the utilization of care services.

4.4.7 Model Testing HRQOL, operated through the Utilization of Care Services and Depressive Symptoms

4.4.7.1 Model Fit

This section added depressive symptoms to the foregoing model in *Section 4.4.6* and aimed to investigate HRQOL in relationship with population characteristics, psychological characteristics, depressive symptoms and the utilization of care services among older adults with PD. The initial fit statistics of the structural model were less adequate, χ^2=77.42, df=12, p=.000, RMSEA=.166. Based on the modification index, error covariance was added between ADL and co-morbidity. This addition achieved acceptable values of the fit index, χ^2=14.62, df=11, p=.200, NIF=.981, GIF=.983, RMSEA=.041.

4.4.7.2 Model Results

The total effects, indirect effects and the standardized effects of the study variables are summarized in Table 54.

(1) Total effects

As presented in the table, depressive symptoms (ß=-.543, p<.001) were found to have the strongest negative total effect on HRQOL, followed by the utilization of care services (ß=-.162, p<.05), co-morbidity (ß=-.079, p<.05), age (ß=-.071, p<.05) and education level (ß=-.020, p<.01). In other words, participants who used more care

services, those with higher levels of depressive symptoms, those with more co-morbid health issues, ones at a more advanced age and ones enjoyed higher levels of education reported less likely to have high levels of HRQOL than their counterparts. On the other hand, participants with higher levels of ADL scores (ß=.042, p<.001) and those with more selective control (ß=.032, p<.01) were more likely to have high levels of HRQOL.

Compared with the model in *Section 4.4.6*, the addition of depressive symptoms into the current model turned the total effects of age and education level on HRQOL from negative to positive.

Notably, depressive symptoms (ß=.421, p<.001) were found to be positively linked to the utilization of care services. This means participants with higher levels of depressive symptoms were more likely to use care services. Besides, participants at a more advance age (ß=.261, p<.001) and those with higher levels of education (ß=.228, p<.01) were indicated to be more likely to use care services as well. On the other hand, the ones with better ADL scores (ß=-.266, p<.001), higher levels of compensatory control (ß=-.050, p<.05) and higher levels of selective control (ß=-.046, p<.01) were less likely to use care services.

Furthermore, selective control (ß=-.378, p<.001) was indicated to have the strongest negative total effect on depressive symptoms, followed by ADL (ß=-.335, p<.001), compensatory control (ß=-.158, p<.001), education level (ß=-.094, p<.001) and age (ß=-.076, p<.01), while participants with higher levels of co-morbidity (ß=.137, p<.01) were more likely to have high levels of depressive symptoms. The entire path model is illustrated in Figure 18.

(2) Indirect effects

In addition to the total effects, this model revealed seventeen paths with indirect effects. Six of them were linked to HRQOL, including age ($p<.01$), education level ($p<.001$), ADL ($p<.001$), co-morbidity ($p<.05$), selective control ($p<.001$) and compensatory control ($p<.01$). The significant indirect relationships that lead to the significant indirect effects are presented in Table 54.

Taken as a whole, the indirect effects of the mentioned predisposing variables on HRQOL operated through ADL, co-morbidity, as well as selective control, the utilization of care services and depressive symptoms. The indirect effects of ADL and co-morbidity operated through selective control, the utilization of care services and depressive symptoms. Furthermore, the indirect effects of selective and compensatory control operated through the utilization of care services and depressive symptoms.

4.4.8 Model Testing HRQOL, operated through the Overall Health Care Utilization

4.4.8.1 Model Fit

This model used the population characteristics, psychological characteristics and the overall health care utilization to test the HRQOL. The initial model resulted in a less satisfactory fit to the data, $\chi^2=77.36$, df=12, p=.000, RMSEA=.166. The modification index suggested that the model fit would be improved by adding error covariance between ADL and co-morbidity. This addition showed a good fit, indicated by the chi-square value χ^2(df=11, n=200)=14.74, p=.195, NIF=.980, GIF=.983, RMSEA=.042, all within the acceptable range of adequate fit.

4.4.8.2 Model Results

The total effects, indirect effects and the standardized effects of the study variables are summarized in Table 55.

(1) Total effects

The findings proved that those with higher levels of selective control (ß=.270, p<.001) and those with higher ADL scores (ß=.224, p<.001) were more likely to have high levels of HRQOL, while co-morbidity (ß=-.153, p<.05), age (ß=-.072, p<.001) and education level (ß=-.015, p<.01) were negatively linked to HRQOL. Additionally, the overall health care utilization had no significant total effect on HRQOL.

Co-morbidity (ß=.323, p<.001) was found to be the only key variable affecting the entire health care utilization. This path model is prfesented in Figure 19.

(2) Indirect effects

In addition to the total effects, this model revealed seven paths with indirect effects. Three of them were linked to HRQOL, including age (p<.001), education level (p<.001) and ADL (p<.01). In general, the indirect effects of the predisposing variables on HRQOL operated through ADL, co-morbidity and selective control. The indirect effect of ADL operated through selective control.

4.4.9 Model Testing HRQOL, operated through the Overall Health Care Utilization and Depressive Symptoms

4.4.9.1 Model Fit

This section added depressive symptoms to the foregoing model and aimed to investigate HRQOL in relationship with population characteristics, psychological components, depressive symptoms and health care utilization overall among older adults with PD. The initial fit statistics of the structural model were poor, χ^2=77.41, df=12, p=.000, RMSEA=.166. The modification indices suggested that the model fit would be improved by adding error covariance between ADL and co-morbidity. This

addition achieved acceptable values of the fit index, χ^2=14.79, df=11, p=.192, NIF=.981, GIF=.983, RMSEA=.042.

4.4.9.2 Model Results

The total effects, indirect effects and the standardized effects of the study variables are summarized in Table 56.

(1) Total effects

As presented in the table, depressive symptoms (ß=-.611, p<.001) were found to have the strongest negative total effect on HRQOL, followed by age (ß=-.114, p<.001), co-morbidity (ß=-.076, p<.05) and education level (ß=-.073, p<.01). On the other hand, participants with higher levels of ADL scores (ß=.023, p<.001) and those with higher levels of selective control (ß=.040, p<.001) were more likely to have high levels of HRQOL.

Notably, depressive symptoms were found to have no total effect on the entire health care utilization. Co-morbidity (ß=.313, p<.001) was the only key variable affecting health care utilization. Those with more co-morbid health issues were more likely to use the entire health care services examined.

In addition, the findings suggested that people with higher levels of selective control (ß=-.378, p<.001), those with better ADL scores (ß=-.331, p<.001) and those with higher levels of compensatory control (ß=-.158, p<.001) were less likely to have high levels of depressive symptoms. Education level (ß=-.094, p<.001) and age (ß=-.075, p<.01) were linked negatively to depressive symptoms as well. On the contrary, people with more co-morbidity health issues (ß=.137, p<.01) were more likely to have high levels of depressive symptoms. This path model is illustrated in Figure 20.

(2) Indirect effects

This model revealed thirteen paths with indirect effects. Six of them were linked to HRQOL, including age ($p<.01$), education level ($p<.001$), ADL ($p<.001$), co-morbidity ($p<.05$), selective control ($p<.001$) and compensatory control ($p<.01$). Notably, the first five above mentioned variables were linked to the outcome variable both directly and indirectly, while compensatory control had merely an indirect effect on HRQOL. The significant indirect relationships that lead to the significant indirect effects are presented in Table 56.

Taken as a whole, the indirect effects of the mentioned predisposing variables on HRQOL operated through ADL, co-morbidity, selective control and depressive symptoms. The indirect effects of ADL and co-morbidity operated through selective control and depressive symptoms. Furthermore, the indirect effects of psychological variables such as selective and compensatory control operated through depressive symptoms.

4.4.10 Summary

Section 4.4 indicated age, education level, ADL, co-morbidity and selective control to be key variables in relation to HRQOL. As noted in Table 57, this consistency was shown across the four different types of health care utilization. Furthermore, HRQOL was proved to be decreased mostly with age and education level. An exception was raised when the utilization of care services was taken into account. In this case, age and education level were found to have positive total effects on HRQOL. Specifically, among the four different types of health care utilization, only the utilization of care services was linked significantly to HRQOL. This finding indicated that those who used

more care services were less likely to have high levels of HRQOL. In addition, variables exerting indirect effects on HRQOL varied depending on the utilization type. Mostly it was age, education level, ADL, and selective control that could have significant indirect effects on HRQOL. As presented in Table 58, the paths indicated operated from age or education, then through ADL and selective control or through co-morbidity.

The second issue of the *Section 4.4* focused on the addition of depressive symptoms into the study framework B. The findings indicated that participants having higher levels of ADL scores and those with higher levels of selective control were more likely to report higher levels of HRQOL, whereas participants having higher levels of depressive symptoms, those with more co-morbid health issues, those at a more advanced age and those with higher levels of education were less likely to show high levels of HRQOL. These results were consistent across the four different types of health care utilization examined. The total effect of depressive symptoms in relation to HRQOL was to be specifically highlighted. Besides, the utilization of care services was proved to have a total effect on HRQOL. Evidence supported that those who used more care services were less likely to report higher levels of HRQOL. Mostly age, education level, ADL, co-morbidity, selective and compensatory control were suggested to have indirect effects on HRQOL, as well as the utilization of care services.

CHAPTER FIVE
DISCUSSION AND CONCLUSIONS

5.1 SUMMARY OF FINDINGS

The mean age of the study participants was 75.07 years, with moderate disease impacts and ADL limitations. The majority (79%) had chronic health issues other than PD. These figures were similar to an epidemiologic study in Taiwan (Wu, 2005) and one study investigating disability and health services use in Brazil (Vagas et al., 2008).

Previous studies suggested that patients with PD used diverse health care resources, such as outpatient services, hospitalization, emergency rooms, rehabilitation, physiotherapies, CAM, mental health care, music therapies, home care, domiciliary nurse care and nursing home care (Cosentino et al., 2005; Gage & Storey, 2004; Leentjens et al., 2008; Nijkrake et al., 2007; Orsini et al., 2004; Parashos et al., 2008; Rajendran, Thompson, & Reich, 2001; Winter et al., 2010b). This study indicated that out-patient services were the most utilized ones (nearly 70%), followed by CIPRS (62.5%), supportive devices (55.5%) and family care (48%). The utilization of social care (7%) and rehabilitation services (25.5%) was found to be relatively low. Addressing this issue, previous results showed a lack of consistency. Nursing home care and prescription medications (Kamat & Smith, 2004), or hospitalization admissions and long term care were suggested to be the most utilized ones in the U.S. (Orsini et al., 2004). In line with Cosentino et al. (2005), the current findings accentuated the high percentage of OPD visits among older adults with PD. A high utilization of complementary and alternative therapies was also confirmed. A combination of complementary and alternative therapies and medication treatments was assumed to be common among Asian patients with PD (Kim et al., 2009; Tan et al., 2006).

Utilization of Single Service Examined: Results Derived from Logistic Regression

On the basis of the hypotheses described in *Chapter 2.6*, the results are reviewed as follows. Firstly, ***Hypothesis 1*** proposed that *all key components within the modified Andersen model are significantly related to health care utilization and relations will hold after mutual control of these components in multivariate test situation.* Logistic regression analysis revealed that the modified Andersen model was relatively effective in explaining the utilization of single health care service examined, the utilization of foreign domestic workers excluded. The tested model accounted for between 23.6% and 53.4% of the variance (Negelkerke R^2) in the utilization of out-patient services and of supportive devices, respectively.

Secondly, after controlling for all model components in multivariate test situation, the findings supported the ***Hypothesis 1*** and highlighted need to be the most significant model component for most of the explained variance. Thirdly, risk factors concerning the investigated issue were suggested to vary from service to service, depending on the service being measured. The findings are summarized below.

- Risk factors regarding the utilization of out-patient services included age, the number of children and disease-related knowledge;
- risk factors regarding the utilization of emergency rooms included gender (female), the number of children, ADL and the social norms;
- ADL acted as the only risk factor concerning the utilization of hospitalization services;
- disease-related knowledge was indicated to be the only risk factor concerning the utilization of CIPRS;

- risk factors regarding the utilization of rehabilitation services included living arrangements (institutionalized), ADL, social welfare related knowledge and the social norms;

- risk factors regarding the utilization of alternative therapies included social support, co-morbidity and the social norms[2];

- risk factors regarding the utilization of supportive devices included age, ADL, co-morbidity, social welfare related knowledge and selective control;

- risk factors regarding the utilization of supplemental health food included gender, age, the number of children and co-morbidity;

- ADL was indicated to be the only risk factor concerning the utilization of family care; and finally

- risk factors regarding the utilization of social care services included marital status, social support, ADL, co-morbidity, social welfare related knowledge and attitudes towards health care.

As presented, ADL was indicated to be the most significant risk factor. Participants having higher levels of functional skills in their everyday living were less likely to use some certain single health care services. Interestingly, the utilization of family care was found with no association with predisposing characteristics such as age and enabling resources such as social support and household expenditure, but only with ADL. This indicated that once older PD patients showed limitations in ADL, the rate of accepting

[2] The other model addressing the utilization of alternative therapies indicated household expenditure (p=.048*, OR=1.569, 95%CI=1.004-2.452) to be significant, next to social support, co-morbidity and the social norms.

family care was relatively high.

Co-morbidity, the second need variable, was suggested to predict positively the utilization of alternative therapies, supportive devices, health food and social care services. Previous research had consistently found an association between need and health care utilization in PD (Consentino et al., 2005; Kim et al., 2009; Spottke et al., 2005; Vargas et al., 2008). Mostly, clinical evaluation was done using the *Hoehn and Yahr Rating Scale* (disease severity), disease duration, co-morbidity, medication and the *Schwab and England Activities of Daily Living Scale* (de Boer et al., 1999; Vargas et al., 2008). Or some comprehensive instruments such as the *Scales for Outcomes in Parkinson's disease* (*SCOPA*) were specifically developed assessing disabilities and impairments of PD (Visser et al., 2008). However, previous research showed a lack of unified instruments assessing need. Morevoer, strong correlations between need and other variables might possibly lead to statistical bias. In this study, need was originally operationalized as HY stage and disease duration, however these two disease-specific items were excluded from the final statistic procedure due to their high zero-order correlations with other variables examined. Hence, this weighty component is recommended to be assessed with extreme caution.

Something to consider and answer further then, is the second hypothesis:

Hypothesis 2: *The consideration of psychological characteristics will significantly add to the explanation of variance in health care utilization.*

Hypothesis 2-A: *More specifically, the present study expects that when the psychological characteristics are introduced into the model, they will be significantly related to health care utilization.*

Generally, the current findings were largely consistent with the ***Hypothesis 2-A***. Next to need, the psychological component was proved to affect health care utilization in a significant way. Important psychological risk factors included the social norms, social welfare related knowledge, attitudes towards health care, disease-related knowledge and selective control.

At this point, certain findings should be highlighted. Firstly, participants who did not arrange health care services on their own were less likely to utilize rehabilitation services and alternative therapies. Secondly, those having higher levels of social welfare related knowledge were more likely to use rehabilitation services, supportive devices and social care. Thirdly, Valldeoriola et al. (2010) suggested that higher levels of disease-related knowledge of patients with PD were associated with greater adherence to their therapies. However, the role of disease-related knowledge was not consistent in the present study. Those with higher levels of disease-related knowledge were indicated to be more likely to use CIPRS, but less likely to use out-patient services than their counterparts. Fourthly, participants with higher levels of positive attitudes towards health care were more likely to consume health food, however less likely to utilize social care services than their counterparts. And finally, those with higher levels of selective control were less likely to use supportive devices than the others. Few previous research findings addressing these issues were available. Becker et al. (2005) found selective primary control to be a significant predictor of assistive device use, whereas after a one-year period, compensatory primary control became significant. These previous research results could not be observed in the present study.

Among the predisposing variables, age was indicated to be the most significant risk factor. Those at a more advanced age were more likely to use supportive devices, health

food and family care. On the contrary, OPD visits were found to decrease with age. Furthermore, consistently with previous studies (Gray et al., 1996), this study also proved that female participants were more likely to consume supplemental health food than males. In prior work authors such as Kim et al. (2009) and Loekk & Nilsson (2010) suggested a higher education level was one of the key variables affecting positively the use of complementary and alternative therapies. According to the present findings, the differential associations between education level and the utilization of alternative therapies were not observed here. In addition, this study suggested that rehabilitation services were more likely to be used by institutionalized older adults with PD than community-dwelling ones. Finally, social care services were more likely to be used by those who were not married at the time of the investigation. This finding was comparable with one early study which suggested that living alone was the greatest predictor of the utilization of care services in the very old age (Linden et al., 1997).

Among the enabling variables, social support was indicated to be able to predict the utilization of alternative therapy and social care. Higher levels of social support were associated with less use of the aforementioned services. Furthermore, higher levels of household expenditure were proved to be related positively to the utilization of rehabilitation services and alternative therapies. It is to be noted that enabling variables such as social support and household expenditure merely showed their impacts on the utilization of some certain services, as stated above, but revealed no effects on the four types of health care utilization examined later.

Additionally, ADL was found to be the only negative predictor regarding the utilization of family care. Back to Table 10, the utilization of family care was predominantly positively correlated to all services examined, the utilization of OPD

excluded. This indicated indirectly the care burden of the family, once older relatives with PD needed to be cared for at home. Besides, a significant correlation (r=236**) between the utilization of family care and foreign domestic workers was also suggested. Furthermore, in view of the observed low rates of the utilization of social care (7%), it should be noted that the utilization of social care was not only associated with need, but also with all other three model components. Particularly, social support was found to be negatively associated with the utilization of social care, yet, those who were not married (widowed, single etc.) at the time of investigation were more likely to use formal care. Back to Table 10, the correlation between the utilization of social care and foreign domestic workers was revealed to be negative (r=-150*).

In summary, the present findings suggested that reasons influencing older adults with PD to utilize health care resources were multifaceted. Inherent in the modified Andersen model, the need component was indicated to have the most significant bearing on health care utilization. Differences in the risk factors of the investigated issues varied with the services examined.

Moreover, the current findings highlighted the role of the psychological component within the modified Andersen model. In addition, after controlling for all model components in multivariate test situations, the predisposing characteristics were still revealed to have enormous significance in relation to the issues examined -- the utilization of CIPRS, OPD, alternative services and family care excluded. Finally, effects of the enabling resources were indicated to be relatively low.

Key Variables Affecting the Health Care Utilization Examined

An overview of key variables with total and indirect effects on the four types of health care utilization investigated is provided as follows. It is to be noted in advance

that in order to avoid violating the assumption of path analysis, reduced models with less variables were constructed. The findings that emerged from path analyses with a summary of variables as significant predictors are presented below.

- ADL, attitudes towards health care and age were significantly linked to the utilization of medical services;
- co-morbidity was significantly linked to the utilization of CAM;
- ADL, age, education level, selective and compensatory control were significantly linked to the utilization of care services; and
- co-morbidity was significantly linked to overall health care utilization.

These key variables were indicated to have total effects on the outcome variable, respectively. Firstly, the present findings showed that those with higher levels of co-morbidity were more likely to use the overall health care services examined. In other words, co-morbidity associated with PD was related to higher health care utilization. This finding was in accordance with the general research conclusion that the need component played the major role in health care utilization among patients with PD (Pressley et al., 2003; Vargas et. al., 2008). Moreover, a ***'top-down'*** view could have led the researcher to a logical speculation about transferring this result to the other types of health care utilization. However, this assumption was proved to be not acceptable, because evidence supported that the utilization of medical and care services was significantly related to psychological and predisposing components, aside from need. On the other hand, from a ***'bottom-up'*** perspective, it was surprising to recognize the non-significance of psychological and predisposing components in regard to entire health care utilization.

Further, co-morbidity revealed itself to be the one and only key variable in relation to the utilization of CAM as well. CAM is described as a set of health care services not currently part of conventional western medicine. Findings indicated that participants with higher levels of co-morbid health issues were more likely to use this type of service. Prior research findings concerning this issue had not been consistent. Helpful predictors of CAM utilization were reported to be negative self-reported health status, higher education of PD patients (Loekk & Nilsson, 2010) and also disease duration (Kim et al., 2009). Within the defined rage of the current thesis, these effects were not observed.

In summary, the need component was associated across with four types of examined health care utilization. As presented, co-morbidity was proved to predict overall health care utilization and the utilization of CAM, whereas ADL was indicated to be associated with the utilization of medical and care services. It was difficult to discover why specific need variables were significant for one type of health care utilization but not another.

One of the contributions of this study was the specification using aggregate of health behavior. This approach has been applied by researchers such as Duan et al. (2007), Martin et al. (2012) and Pai, Godboldo-Brooks, & Edington (2010). Once the single services had been aggregated into medical and care services, the role of psychological and predisposing components became clear.

Firstly, ADL and age were found to have negative total effects on the utilization of medical services, while attitudes towards health care were indicated to positively affect the utilization of medical services. Addressing impacts of attitudes on health service use, some previous studies, not specifically focusing on individuals with PD, found that

attitudinal factors could predict a higher use of medications in old age (Linden et al., 1997), higher actual use of health services (ten Have et al., 2010) and higher use of long-term care (Bradlely et.al., 2002). In addition, Lilja et al. (2003) found that older adults who accepted rehabilitation were better equipped with supportive devices than those who had negative attitudes towards rehabilitation.

Secondly, the current findings indicated ADL, selective control and compensatory control had negative total effects on the utilization of care services, while age and education level were slightly positively linked to the utilization of care services. Previously, logistic regression analysis revealed that the utilization of family care was only associated with ADL, while the utilization of social care was predicted by variables across the four model components inherent the modified Andersen model. Moreover, once the three care-related single services were aggregated into care services, path analysis identified selective and compensatory control to be significant, next to need and predisposing key variables. Based on the picture that emerged from these findings, it could be assumed that once care was provided by non-family members, this type of utilization turned out to be multifaceted.

Furthermore, although the theoretical differences between selective and compensatory control could not be proved here, the current findings indicated that higher levels of perceived control were linked to less use of care services. Similarly, one early study also suggested that individuals with low levels of control were more likely to use health services than their high-control counterparts (Chipperfield & Greenslade, 1999).

As presented, the aforementioned findings illustrated not only effects of the psychological model component on the two types of health care utilization, but also

highlighted that measuring health care utilization at the *'aggregate'* level is helpful in terms of exploring the various roles of the main components in the modified Andersen model.

Regarding the predisposing model component, firstly, the current study indicated age to have a positive total effect on the utilization of care services. Generally, prior findings consistently suggested a positive association between increasing age and health care use. A national survey in Taiwan (Taiwan DOH, 2008) also indicated that older adults used disproportionately more health services and had higher medical care expenditure than other age groups did. Secondly, it was surprising that the present study indicated age to be negatively associated with the utilization of medical services. In other words, with increasing age the older adults with PD were more likely to use care services, but less likely to use medical services. Possible reasons for this differentiation may result from severe movement difficulties and focusing on medication therapy among PD patients with long disease progression and the increasing care need.

Furthermore, this study indicated education level had a slight positive total effect on the utilization of care services. Parashos et al. (2002) noted also that a higher education level was a significant predictor of more physician consultations among patients with PD. However, the inconsistent relationship between education level and health care utilization continued to be apparent in recent research findings (Spottke et al., 2005).

Notably, enabling resources, in comparison with the other three model components within the study framework A, exerted less influences on health care utilization. Addressing the issue of enabling resource, Kadushin (2004) suggested that people with a lower level of informal support were more likely to use home health care.

Furthermore, a Taiwanese study reported that social support had a significant total effect on influencing individuals with osteoporosis to engage in preventive behaviors (Hsieh et al., 2005). However, the current thesis could not identify any total effect derived from social support. In addition, in line with the findings of Blackwell et al. (2009), the present study indicated that socioeconomic status had no significant predictive power addressing health services use.

One of the fundamental contributions of the present study was to use path analysis to estimate the significance of relationships between all of the variables observed in the modified model. Not only direct and indirect effects between the main model components and the outcome variable were examined, but also associations between the four components. In general, across the four different types of health care utilization,

- age was indicated to have positive total effects on co-morbidity and attitudes towards health care, whereas age was suggested to have negative total effects on co-morbidity, social welfare related knowledge and selective control;

- education level was indicated to have positive total effects on ADL, social welfare related knowledge, selective and compensatory control, whereas education level was negatively linked to co-morbidity;

- the number of children was indicated to have a positive total effect on social support, whereas the number of children was linked negatively to social welfare related knowledge; and

- ADL was indicated to have a positive total effect on selective control.

Significant relationships between the predisposing and psychological variables were revealed. It is not surprising that those at a more advanced age were more likely to

have more positive attitudes towards health care and to have lower levels of social welfare related knowledge. Moreover, ones with higher levels of education were found to be more likely to have social welfare related knowledge. Importantly, this study highlighted that selective control decreased with age, but increased with education level and ADL scores. Furthermore, those with higher levels of education were also indicated to have higher levels of compensatory control. Additionally, the number of children was found to be associated positively with social support, however older adults with more children were suggested to be less likely to have high levels of social welfare related knowledge.

Regarding indirect effects within the path models, it is to be noted that predisposing characteristics were indicated to have indirect effects on the relevant outcome variables. For instance, age was indicated to have positive indirect effects on the four different types of health care utilization; education level was found to have negative indirect effects on the utilization of medical and care services. In general, these indirect effects primarily operated through need and through the significant psychological variables such as attitudes towards health care, selective and compensatory control, respectively. Additionally, need revealed an indirect effect on the utilization of care services, operating through selective control.

To conclude, the *'aggregate'* approach demonstrated that the key variables affecting the four types of health care utilization differed from each other and highlighted the impacts of psychological variables addressing the utilization of medical and care services, respectively. In addition, some interesting relationships were revealed in the path models. First, with increasing age, older adults with PD were more likely to use high levels of care services, but not medical services. Second, participants with

more children were more likely to receive high levels of social support, however less likely to be aware of social welfare services. Third, ADL was found to be positively linked to selective control. These three issues could be of great significance to clinical practice and patients' education programs.

HRQOL among Older Adults with Parkinson's Disease

Hypotheses 3 through 6, which had proposed relationships among population characteristics, psychological characteristics, health care utilization and depressive symptoms on HRQOL in *Chapter 2.6*, were examined and the results are reviewed below in terms of their relationship with these hypotheses.

Hypothesis 3*: Population characteristics within the study framework B are significantly related to HRQOL.*

Hypothesis 4*: Psychological characteristics within the study framework B are significantly related to HRQOL.*

Hypothesis 4-A*: More specifically, the present study expects that a high level of psychological characteristics will significantly enhance HRQOL.*

Hypothesis 5*: Health care utilization is significantly related to HRQOL.*

Hypothesis 5-A*: More specifically, the present study expects that a high level of health care utilization will significantly reduce HRQOL.*

Hypothesis 6*: Depressive symptoms will play a major role in the relationship between health care utilization and HRQOL.*

Hypothesis 6-A*: More specifically, the present study expects that a high level of depressive symptoms will significantly reduce HRQOL.*

Hypothesis 6-B*: The present study expects that a high level of depressive symptoms will significantly enhance health care utilization.*

Consistently, previous research highlighted depressive symptoms as the most clearly identified key variable of HRQOL (Soh, Morris, & McGinley, 2010). The current study analyzed first the relationship between health care utilization and HRQOL, and then in the context of health care utilization, depressive symptoms and HRQOL. The findings are presented below.

- Regarding HRQOL, operated through the utilization of medical services: selective control was indicated to have the most significant positive total effects, followed by ADL, while co-morbidity was suggested to have the most significant negative total effects, followed by age and education level. This finding counted also for the models testing HRQOL, operated through the utilization of CAM and through overall health care utilization, respectively;

- regarding HRQOL, operated through the utilization of care services: the utilization of care services was indicated to have the most significant negative total effect, followed by co-morbidity, while selective control was indicated to have the most significant positive total effect, followed by ADL. In addition, age and education level were found to have slight positive effects on HRQOL;

- regarding HRQOL, operated through the utilization of medical services and depressive symptoms: depressive symptoms were indicated to have the most significant negative effect, followed by age, co-morbidity and education level, while ADL and selective control were suggested to have slight positive effects on HRQOL. This finding counted also for models testing HRQOL, operated through the utilization of CAM and through overall health care utilization, respectively; and

- regarding HRQOL, operated through the utilization of care services and depressive symptoms: depressive symptoms were indicated to have the most significant

negative effect, followed by the utilization of care services, co-morbidity and education level, while ADL and selective control were suggested to have slight positive effects on HRQOL.

HRQOL, Operated through Health Care Utilization

A central finding of this study was to highlight selective control as the most significant key variable affecting HRQOL of older adults with PD. Participants with higher levels of selective control were indicated to be more likely to have high levels of HRQOL. In comparison with this result, Arnold et al. (2006) observed that changes of perceived control among COPD patients were related to a better QOL. Moreover, Gruber-Baldini et al. (2009) indicated that greater internal locus of control was associated with less disability and suggested promoting PD patients' control belief with the aim of improving QOL in PD. Previous studies emphasized that psychological and behavioral factors influenced QOL in PD more than physical ones did (Cubo et al., 2002; Klepac et al., 2008; Schrag, 2006), however research investigating relationships between perceived control and HRQOL was rare, making this result of particular interest.

Addressing ***Hypothesis 4-A***, the current study proved that a high level of selective control was helpful in enhancing HRQOL among older adults with PD. In comparison with the current issue, McQuillen Licht, & Licht (2003) also reported that disease severity and perceived control, specifically perceived internal secondary control had significant indirect effects on QOL.

Addressing ***Hypothesis 3,*** this study confirmed that population characteristics such as age and education level were significantly linked to HRQOL. Controversy in literature had been identified about whether age is associated to HRQOL among

individuals with chronic health problems. Mostly, previous work suggested that the effect of age diminished, once this variable was controlled (Michelson, Bolund, & Brandberg, 2000; Trivedi et al., 2006). On the other hand, authors such as Karlsen et al. (1998) and Winter et al. (2010c) indicated age to be associated with QOL in PD. Research findings addressing the relationship between education level and HRQOL provided a predominantly consistent indication that education level was associated with better QOL (Cubo et al., 2002; Carod-Artal, Vargas, & Martinez-Martin, 2007). Unexpectedly, the relationships between age, education level and HRQOL were observed in the current thesis to work in the opposite direction. However, it is to be noted that the total effects of age and education level on HRQOL were relatively less significant in this study. Additionally, in a similar vein, the present findings indicated a positive impact of ADL on HRQOL, and a negative association of co-morbidity to HRQOL, as prior work did (Den Oudsten, Van Heck, & De Vries, 2007; Hirayama et al., 2008).

One of the major contributions of this thesis was examining ***Hypothesis 5*** and pointing out the negative effect of utilization of care services on HRQOL. Those who made more use of care services were less likely to have high levels of HRQOL. As stated previously, across the other three types of health care utilization examined, selective control was indicated to have the most significant positive total effects on the outcome. However, when the utilization of care services was taken into consideration, this variable revealed a stronger effect on HRQOL than selective control. Besides, it is interesting to observe that the total effects of age and education level on HRQOL turned out in this constellation to be positive. It is worth mentioning that little research had been done that explicitly linked health care utilization to HRQOL among PD patients. Addressing other target groups, previous studies reported a negative relationship

between health care use and HRQOL (Guilbert et al., 2011; Singh & Muldoch, 2007). This was also proved in the current study, however only the utilization of care services was found to be negatively linked to HRQOL.

In addition, concerning the indirect effects, mostly age, education level and ADL were suggested to have indirect effects on HRQOL. Within the model including the utilization of care services, selective control was found to have an indirect effect on HRQOL. Generally speaking, the relevant paths operated through ADL and selective control or through co-morbidity.

In summary, selective control, ADL, co-morbidity, age and education level were indicated to be key variables affecting HRQOL. Moreover, the current thesis highlighted the impact of the utilization of care services on HRQOL, because those who used more care services were found to be less likely to have high levels of HRQOL. Finally, the indirect effects of predisposing variables were indicated to operate through two of the need variables as well as the psychological variable.

HRQOL, Operated through Health Care Utilization and Depressive Symptoms

Overall, evidence from the data met the ***Hypothesis 6*** and indicated depressive symptoms to be the most significant variable affecting HRQOL. Moreover, as the ***Hypothesis 6-A*** expected, the occurrence of depressive symptoms was associated with reduced HRQOL among the study sample with PD. In other words, those having more depressive symptoms were less likely to have high levels of HRQOL. This result was in line with most of the previous research (Carod-Artal, Vargas, & Martinez-Martin, 2007; Carod-Artal et al., 2008; Chen, Kales, & et al., 2007; Qin et al., 2009) and had some similarity with Visser's model (2008) (see Figure 6), which also emphasized the importance of depressive symptoms in regard with HRQOL among PD patients.

In addition, from the overall view of health care utilization, ***Hypothesis 6B*** could not be proved, because evidence indicated no significant relationship between depressive symptoms and overall health care utilization. However, interestingly, once the entire services were divided into certain types, as defined in the present study, the findings clearly emphasized that those with higher levels of depressive symptoms were more likely to use medical and care services, respectively.

Next to depressive symptoms, age, co-morbidity and education level were indicated to have a negative total effect on HRQOL. These findings indicated that participants at a more advanced age, those with more co-morbid health conditions and ones with higher levels of education were less likely to have high levels of HRQOL. General speaking, as ***Hypothesis 3*** predicted, the above mentioned population characteristics were proved to have total effects on HRQOL.

In addition, addressing the enabling characteristics in health care utilization, previous research had consistently indicated that a low level of social support was associated with diminished QOL (Winter et al., 2010c), a high prevalence of depression (Ehmann, 1990; Simpson et al., 2006) and an increasing use of health care services by PD patients (Peng, Navaie-Waliser, & Feldman, 2003; Wilkins & Beaudet, 2000). In other words, social support was viewed as an important predictor of health care utilization and psychological well-being in PD -- not only in western countries, but also in Chinese cohorts (Cheng et al., 2008; Zhao et al., 2008). Unexpectedly, the present study could not find any evidence to prove the relationship between social support, health care utilization and HRQOL.

Furthermore, the addition of depressive symptoms into the model minimized the positive total effects of selective control and ADL. Both of these two variables were found to have slight total effects on the outcome. Evidence showed that selective control and ADL were indicated to have strong total effects on depressive symptoms and were suggested to have significant indirect effects on HRQOL, the total effects derived from these two variables on HRQOL were mediated. Addressing ***Hypothesis 4***, specifically ***Hypothesis 4-A***, a higher level of selective control was found to be associated with a better HRQOL among older adults with PD.

The result of testing ***Hypothesis 5*** indicated that the utilization of care services had a negative total effect on HRQOL. However, the total effect derived from the utilization of care services was less strong than the total effect resulting from depressive symptoms. In addition, addressing depressive symptoms, the findings suggested that participants with higher levels of co-morbidity were more likely to suffer from depression, while those with higher levels of selective control, ADL, compensatory control, education level and age were less likely to have high levels of depressive symptoms.

Finally, addressing indirect effects, age, education level, ADL, co-morbidity, selective and compensatory control were suggested to have indirect effects on HRQOL. It should be mentioned that compensatory control was proved to affect the outcome variable indirectly. Besides, age, education level and ADL were found to have indirect effects on depressive symptoms. In general, the indirect effects of age and education on HRQOL operated through ADL, selective control and depressive symptoms or through co-morbidity and depressive symptoms.

In comparison with the models without the involvement of depressive symptoms, the current findings highlighted firstly the adverse association between depressive

symptoms and HRQOL. Next to depressive symptoms, age as well as co-morbidity, education level, selective control and ADL were found to affect HRQOL too. Specifically, the utilization of care services was proved to have a negative total effect on HRQOL. Besides, those who have high levels of depressive symptoms were indicated to use more care and medical services, respectively. Finally, the indirect effects of predisposing variables were indicated to operate through ADL and co-morbidity, respectively, then through selective control and depressive symptoms.

Summary

This study rested on a strong conceptional base of the behavioral model of healh care utilization. Addressing the utilization of single service, logistic regression analysis suggested that risk factors varied from service to service, depending on the service being measured. Once the single services were aggregated into four types, path analysis revealed the total effects of need, followed by psychological key variables such as attitudes towards health care, selective and compensatory control, particularly in regard with the utilization of medical and care services.

Moreover, depressive symptoms, the utilization of care services, selective control, ADL, co-morbidity, age and education level were indicated to have total effects on HRQOL among older adults with PD. Particularly, high levels of depressive symptoms were more likely to be associated with an increasing utilization of medical and care services. Greater use of care services was negatively linked with HRQOL. Additionally, indirect effects on HRQOL and the complex interplay inherent in the modified Andersen model were identified as well.

In short, the overall picture that emerged from the current findings showed that the modified model had contributions to further the understanding of health care utilization

in PD. Additionally, path analysis was helpful in indicating that several of the predisposing and need variables, as well as the added psychological variables, affected health care utilization and HRQOL indirectly through other variables. In comparison with previous research discussing predictors influencing health care utilization in PD, which had used a similar set of variables without mentioning any theoretical linkage to the Andersen model (Le Boer et al., 1999; Visser et al., 2009), the present study made an original contribution by introducing a well established model in public health into the field of health psychology and ascertained that this conceptualization was revealed to be potentially fruitful for future investigations addressing health care utilization in PD.

5.2 STRENGTHS AND LIMITATIONS

Due to its immense health care need and ecological burden, PD has received an increasing amount of attention not only in health practice but also in research. The current study represented a cross-sectional view of health care utilization and HRQOL among older Taiwanese adults with PD. Importantly, this study was guided by an extended Andersen model and applied a broader psychological perspective in testing health care utilization in PD. Moreover, unlike many previous projects focusing on health care utilization as a whole construct, the present study aggregated the health care services examined into medical, CAM, care and overall services, and examined key variables affecting different types of health care utilization. Furthermore, in line with recent PD research, the present study explored HRQOL among older adults with PD and its relationships with health care utilization and depressive symptoms. However, there are a number of limitations that need to be considered when interpreting the current findings.

Firstly, the present study used the cross-sectional design, which prohibited drawing

any definitive conclusions about causal relationships between the variables and failed to identify changes of both the main issues over time (Schreurs, De Ridder, & Bensing, 2000). Secondly, addressing representativeness, the participants were recruited from Taipei and they might be representative of a metropolitan setting in Taiwan rather than of the whole population. Moreover, PD patients with cognitive impairments were excluded from this research project. Since there is a high prevalence of dementia with advancing PD (Giladi et al., 2000), this sampling criterion might lead to limitations to the generalisability of the research results.

Another major limitation of this study was in regard to the measurements themselves. First, the conceptualization of what constituted health care services might be too narrow to include every possible service for patients with PD. Second, the simplistic classification of medical, CAM and care services had some limitations, because health care services were regarded as a simple tally of numbers of visits to various services. Furthermore, the measurement of social support with tools that had not been fully validated might represent possible explanations for the lack of expected relationship between social support, health care utilization and HRQOL. In addition, a structured questionnaire via face-to-face interviews was conducted for data collection. Several questions asked about participants' experience concerning health care utilization in a recent time frame. Recall bias might emerge from self-reports, however this method was empirically assured to be not likely to pose a problem in the clinical context of PD (Mauldin et al., 2008).

This present study addressed specific limitations in data analysis. In the interests of avoiding multicollinearity and following assumptions of path analysis, analyses were not carried out for all independent variables proposed in the study frameworks. There

was certainly some loss of precision in using a reduced set of variables and this approach was viewed to be a limitation of the present study.

5.3 RECOMMENDATIONS

5.3.1 Recommendations for Clinical Practice

To enhance clinical practice, several recommendations are proposed as follows. In line with previous research (Cosentino et al., 2005; Gage & Storey, 2004; Nijkrake et al., 2007; Rajendran, Thompson, & Reich, 2001), the current findings suggested that PD patients used a broad range of health care services to cope with the complex and multifaceted impairments accompanied with this chronic neurological illness. Addressing this issue, a well-guided referral system within the clinical practice, the implementation of PD nurse specialists (MacMahon, 1999; Osborne, 2009) and Parkinson's centers providing multidisciplinary health care programs (van der Marck et al., 2009) are strongly recommended.

Moreover, awareness of disease-related and social welfare related information was indicated to exert essential influence on the utilization of certain single services. Although no significance between social support and health care utilization could be confirmed in this study, however it was found that those who let their younger family members and spouses organize their health care appointments were less likely to use rehabilitation and alternative therapies than their counterparts. Furthermore, a negative association between the number of patients' adult children and social welfare related knowledge was identified. These findings led to the assumption that health care utilization could be indirectly affected by filial conditions. Accordingly, health authorities and service providers are recommended to ensure that a lack of appropriate information and other support initiatives is not a barrier to the use of health care

resources, not only for PD patients, but also for their family members and care givers (Bhatia & Gupta, 2003; Simons, Thompson, & Smith Pasqualini, 2006).

As reported in literature, the cognitive-behavioral intervention is gradually gaining importance in the clinical practice for older adults with PD (DeFronzo Dobkin, Allen, & Menza, 2007; Hautzinger, 2002; Macht & Ellgrin, 2008). This current study also pointed out that perceived control, specifically selective control not only has a significant effect on the utilization of care services, but also strongly impacted depressive symptoms and HRQOL. Hence, such intervention is recommended to incorporate the concept of perceived control into the design and implementation of studies and treatment.

In addition, depression is viewed in literature as a frequently observed neuropsychiatric phenomenon in PD (Stella et al., 2008). In line with previous research (Chen, Kales, & et al., 2007), the current study indicated that the occurrence of depressive symptoms in PD was associated with greater health care utilization, specifically greater use of medical and care services, respectively, and lower HRQOL. Accordingly, diagnostic training courses addressing depression in PD are recommended for clinical practice. A prior study also pointed out that recognition of depression should be an important part of treatment of PD (Slawek, Derejko, & Lass, 2005). Moreover, this study suggested that the presence of depressive symptoms minimized the total effect of selective control on HRQOL. Hence, screening, prevention and treatment for depression in PD should be embedded in comprehensive neuropsychological evaluations of the clinical routines.

5.3.2 Recommendations for Future Research

Several recommendations can be made to expand further research. Firstly, since the

modified Andersen model can provide an overall picture of the relationship between the multifaceted impact factors, particularly depressive symptoms and health care utilization in relation to HRQOL, it is recommended that this model is employed to further health services utilization studies addressing Parkinson's disease. Moreover, empirical research is required in the near future to test the modified framework in a broader way - with consideration of clinical symptoms (Chrischilles et al., 2002) and disease-specific implications (Visser, 2008), as well as psychological, environmental and system-level components.

Since the factors that influence health care utilization in PD may differ according to the type of service used, future research into different health services may be needed in order to compare different utilizations of the different health services. Additionally, in order to gain a deeper insight into the main issues examined, qualitative and quantitative approaches need to be considered. Moreover, because health care utilization and HRQOL are complex constructs and may develope over time, longitudinal studies using national databases are needed to definitively determine the predictors of health care utilization in PD.

As stated previously, the utilization of foreign domestic workers was found to be positively correlated with the utilization of family care, but negatively with the utilization of social care. Hence, it is necessary to gain a deeper insight into the 'complement vs. substitution' hypothesis (Bolin, Lindgren, & Lundborg, 2008; Davey et al, 2005) between the use of informal care and formal care in Taiwan.

Furthermore, the present study could not find any evidence to prove the relationship between social support, health care utilization and HRQOL. Hence, implementation of specified validated instruments addressing disease severity, social support, psychological

outcome, depression and HRQOL should be taken into consideration, particularly in Taiwan and certain Asian countries in the stage of demographic transition (Glaser et al., 2006) and enormous changes regarding filial norms and family support (Cornman et al., 2004).

Finally, future studies should pay more attention to health care utilization in PD and identify factors which could enhance the effectiveness and quality of health care services for PD patients on the one hand, and slow down costs of medical and care resources use on the other hand. Evaluation studies investigating the cost-effectiveness of cognitive-behavioral interventions and multidisciplinary care for example are strongly recommended.

5.4 CONCLUSION

The contribution of the current thesis was to describe in detail, for the first time, the health care utilization of older adults with PD in Taiwan. This study supported the initial suppositions with regard to the predictive potentials of the modified Andersen model and the integration of HRQOL into the model as the health outcome, examined in the constellation of health care utilization and depressive symptoms.

Three major conclusions can be drawn from the current study. First, key variables affecting the utilization of single health care service varied from service to service, depending on the characteristics of each particular service measured.

Second, the current findings highlighted impacts derived from the need component across all the four examined types of health care. Once the single services had been aggregated into medical and care services, the role of the psychological and predisposing components become noticeable.

Third, to an important extent, this study identified a positive relationship between selective control and HRQOL among older PD patients. Furthermore, ADL, co-morbidity, age and education level were indicated to affect HRQOL as well. Importantly, evidence supported that only a higher use of care services substantially led to worse HRQOL. Once depressive symptoms had been taken into account, the adverse association between depressive symptoms and HRQOL diminished the total effect of selective control on HRQOL. In this case, selective control exerted an expanded indirect effect on the outcome, operated through depressive symptoms.

A weighty issue arising from this study was that, despite the need factor, the approach of considering psychological correlates of health care utilization within the modified Andersen model was revealed to be productive. The integration of the psychological perspective into patient education programs and the development of cognitive-behavioral therapies are helpful in providing for the triage of PD patients' well-structured support, specialized health care services and assured quality of life.

More research into differentiated types of health care utilization and their predictors, the relationships between psychological, environmental-, system-level factors and health care utilization, the cost-effectiveness of cognitive-behavioral interventions and multidisciplinary care approach and the important issue of HRQOL among older adults with PD are areas of further research arising from this study.

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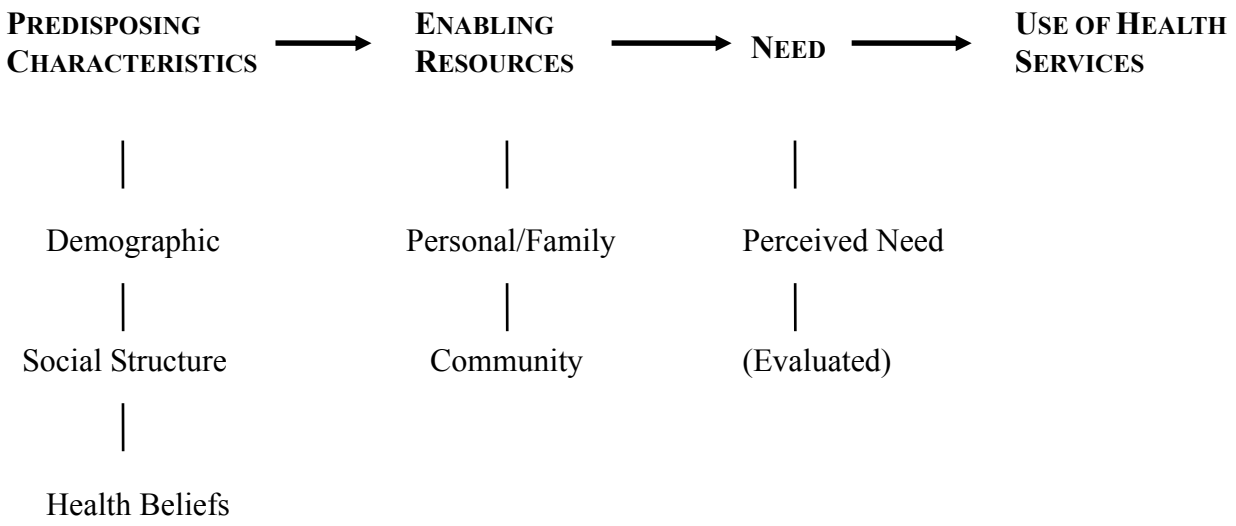

Figure1. The Initial Andersen Model of Health Care Utilization

Andersen (1995)

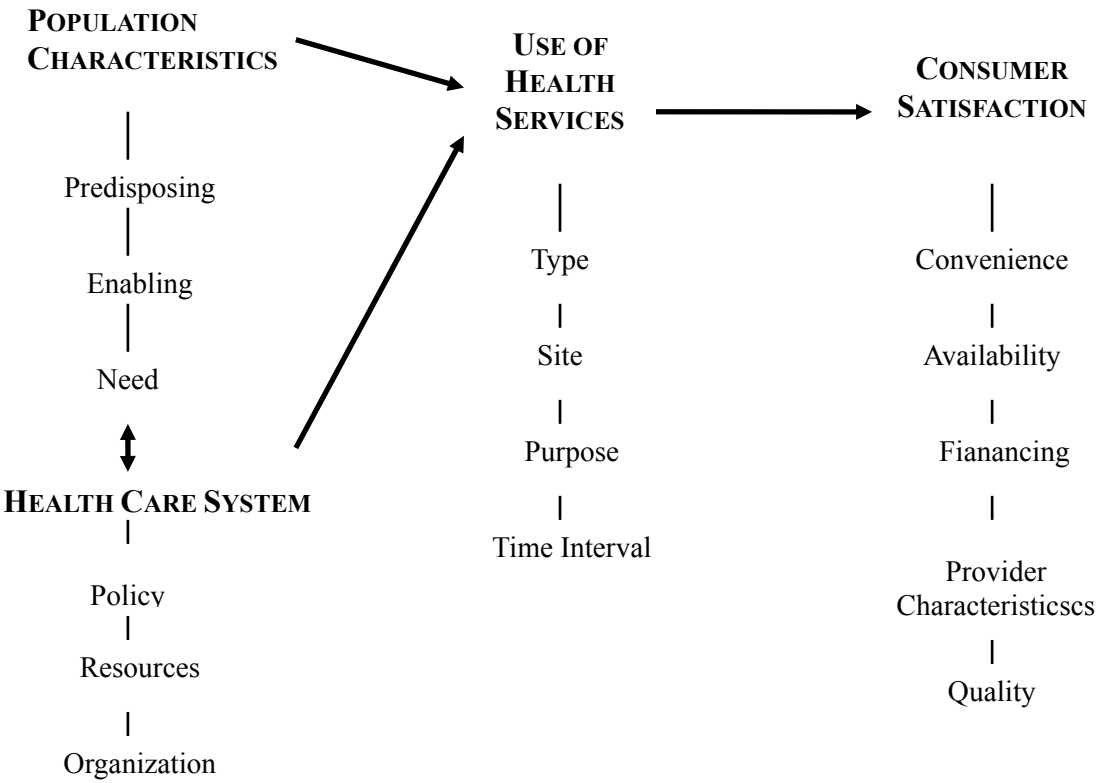

Figure 2. The Andersen Model of First Revision

Andersen (1995)

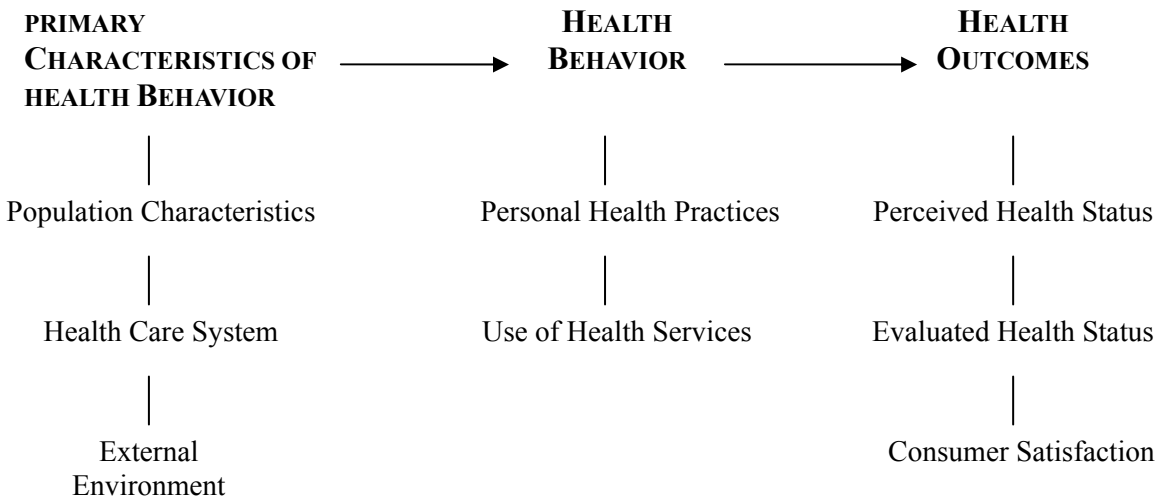

Figure 3. The Andersen Model of Second Revision

Andersen (1995)

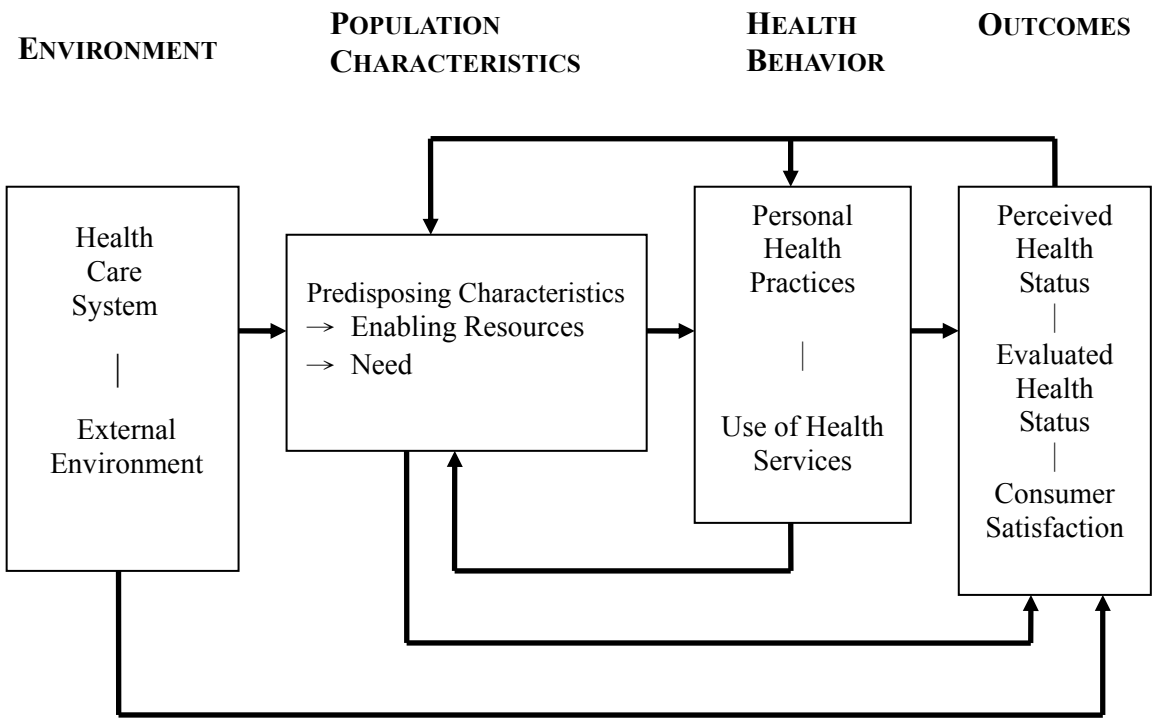

Figure 4. The Andersen Model of Third Revision

Andersen (1995)

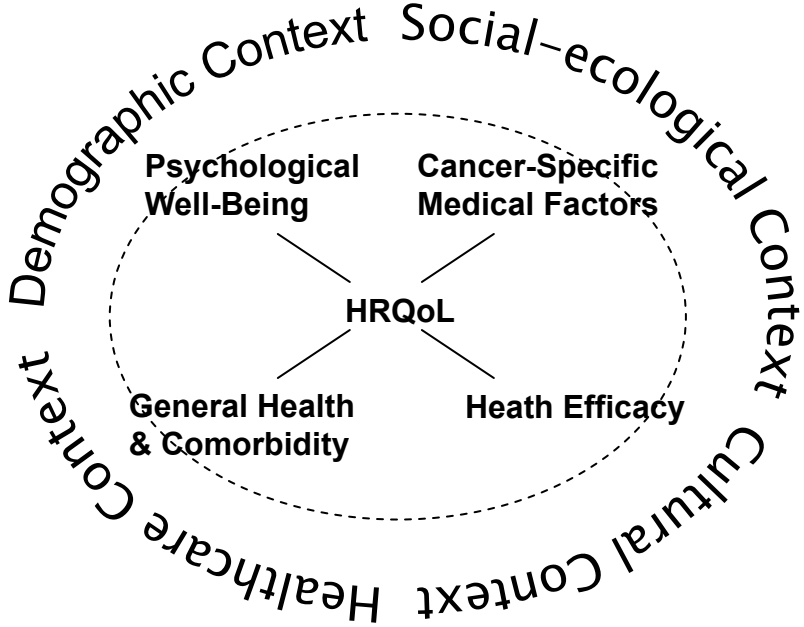

Figure 5. Ashing-Giwa's Contextual Model of Health Related Quality of Life

Ashing-Giwa (2005)

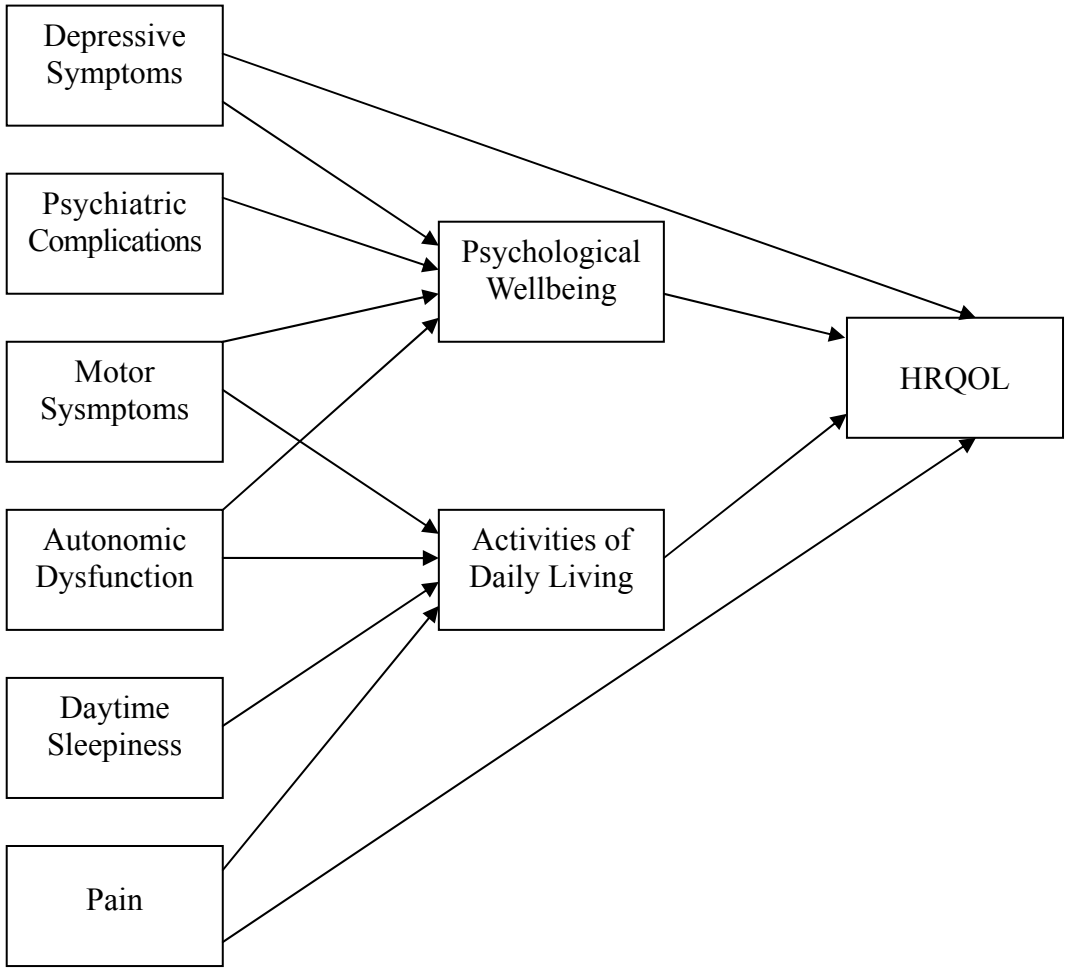

Figure 6. Visser's Comprehensive Model of Health Related Quality of Life in Parkinson's Disease

Visser (2008)

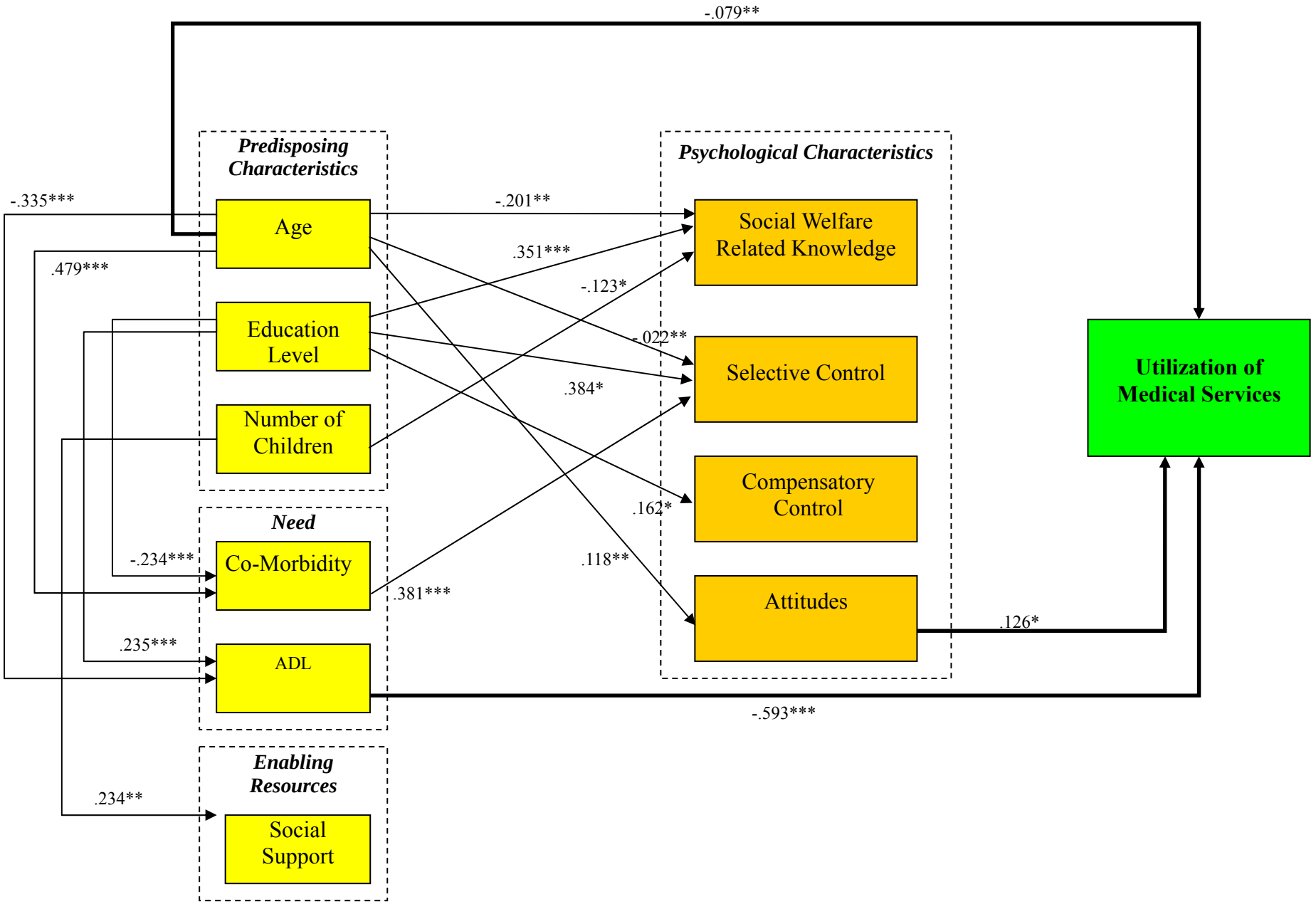

Figure 9. Path Model Predicting the Utilization of Medical Services

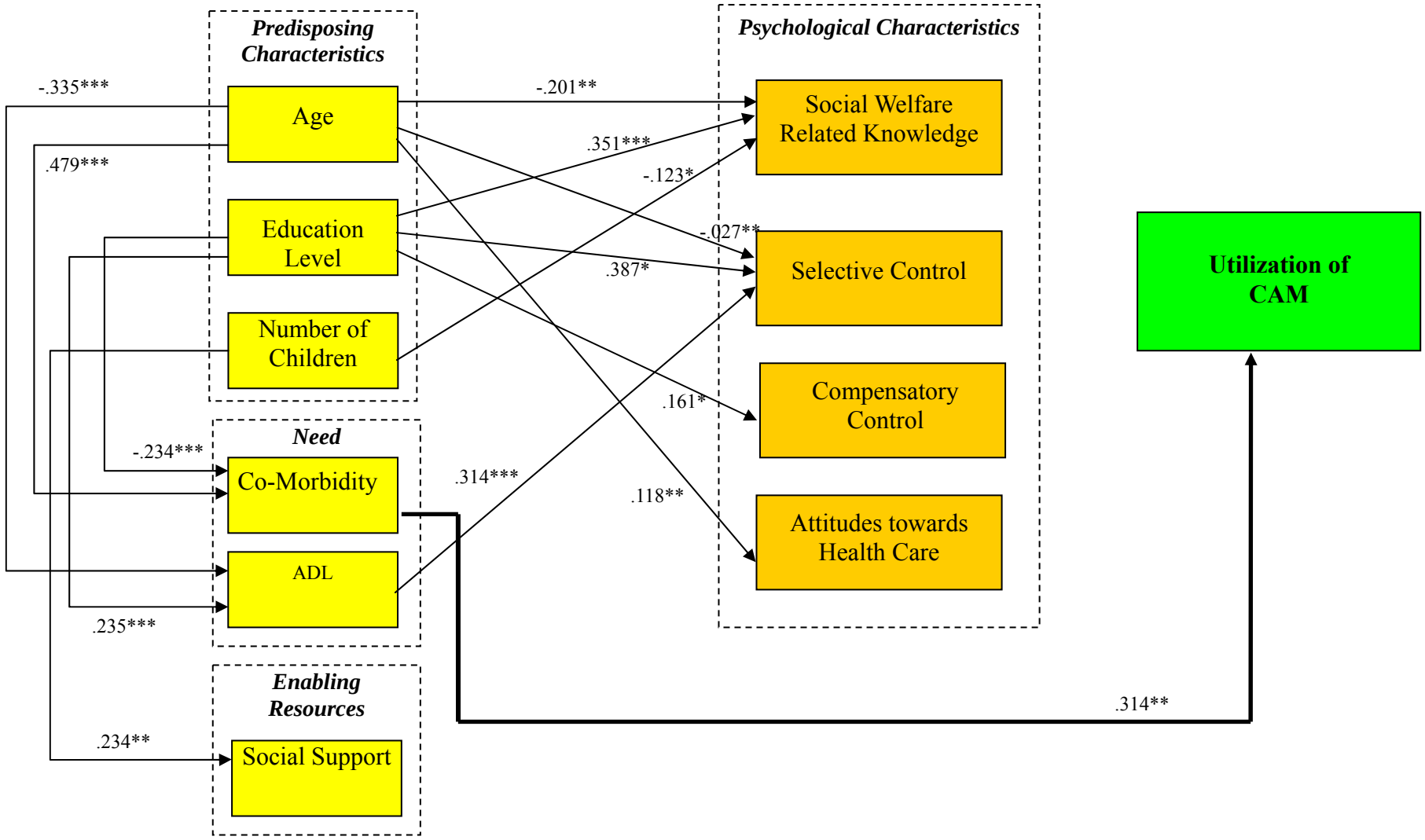

Figure 10. Path Model Predicting the Utilization of CAM

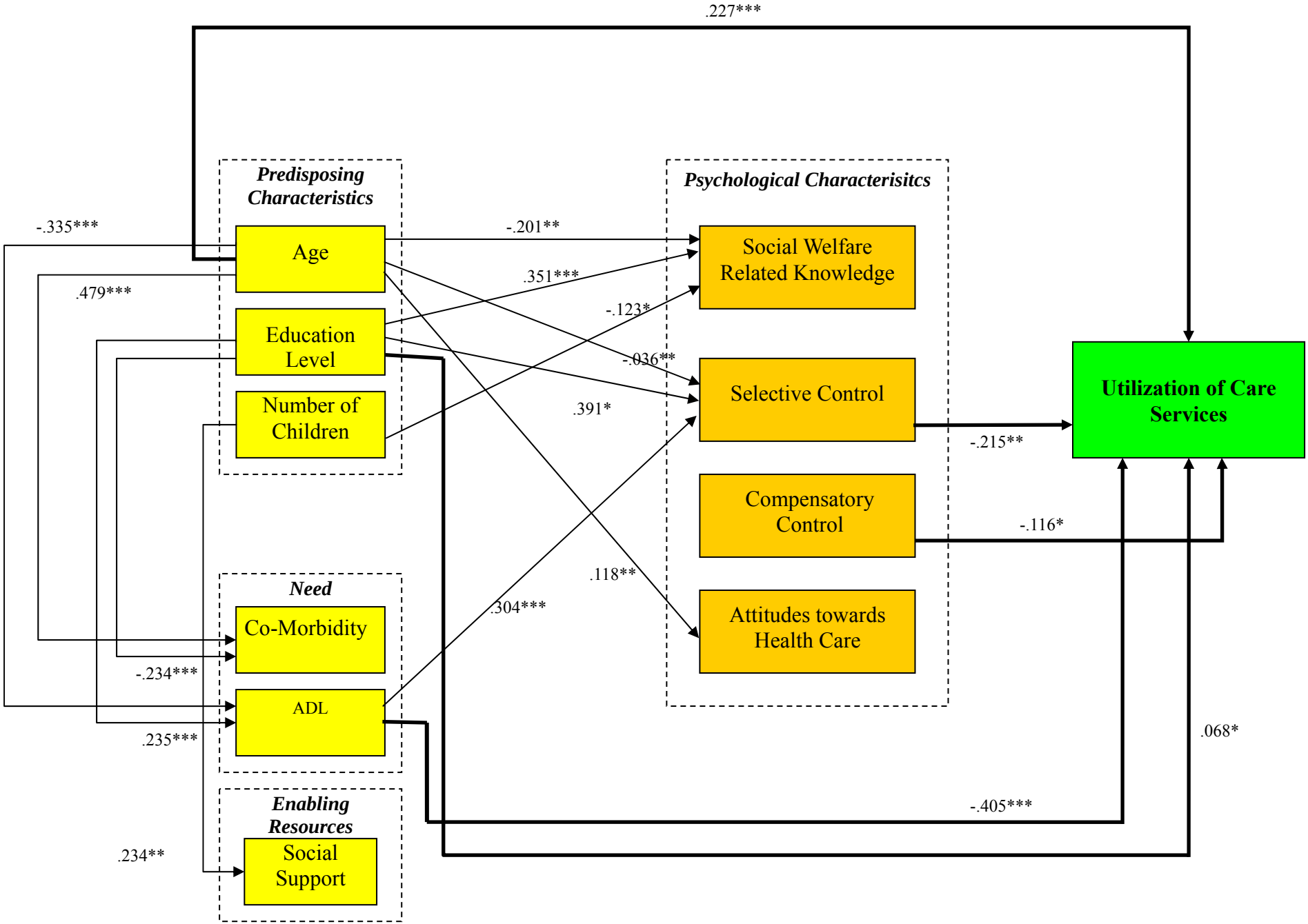

Figure 11. Path Model Predicting the Utilization of Care Services

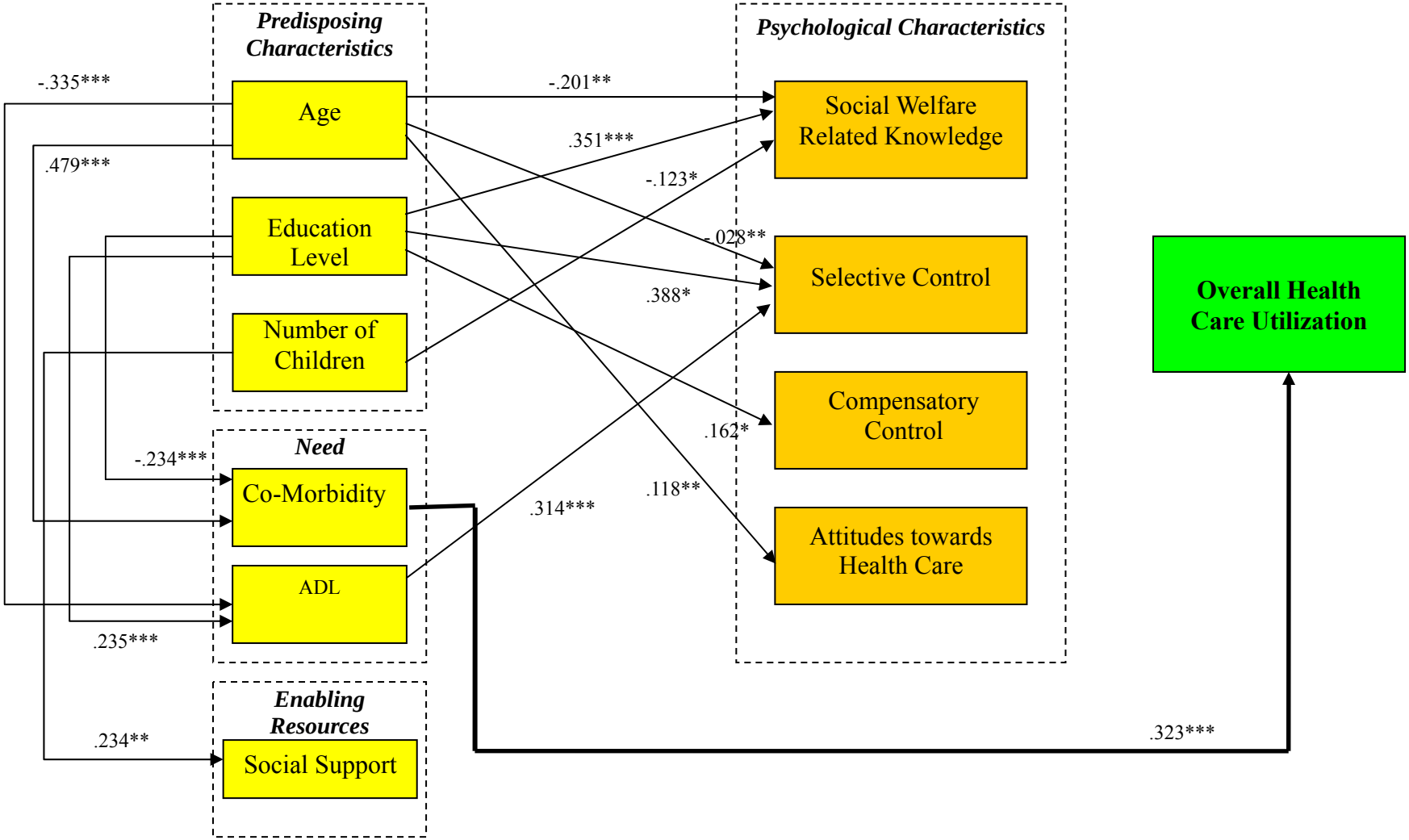

Figure 12. Path Model Predicting Overall Health Care Utilization

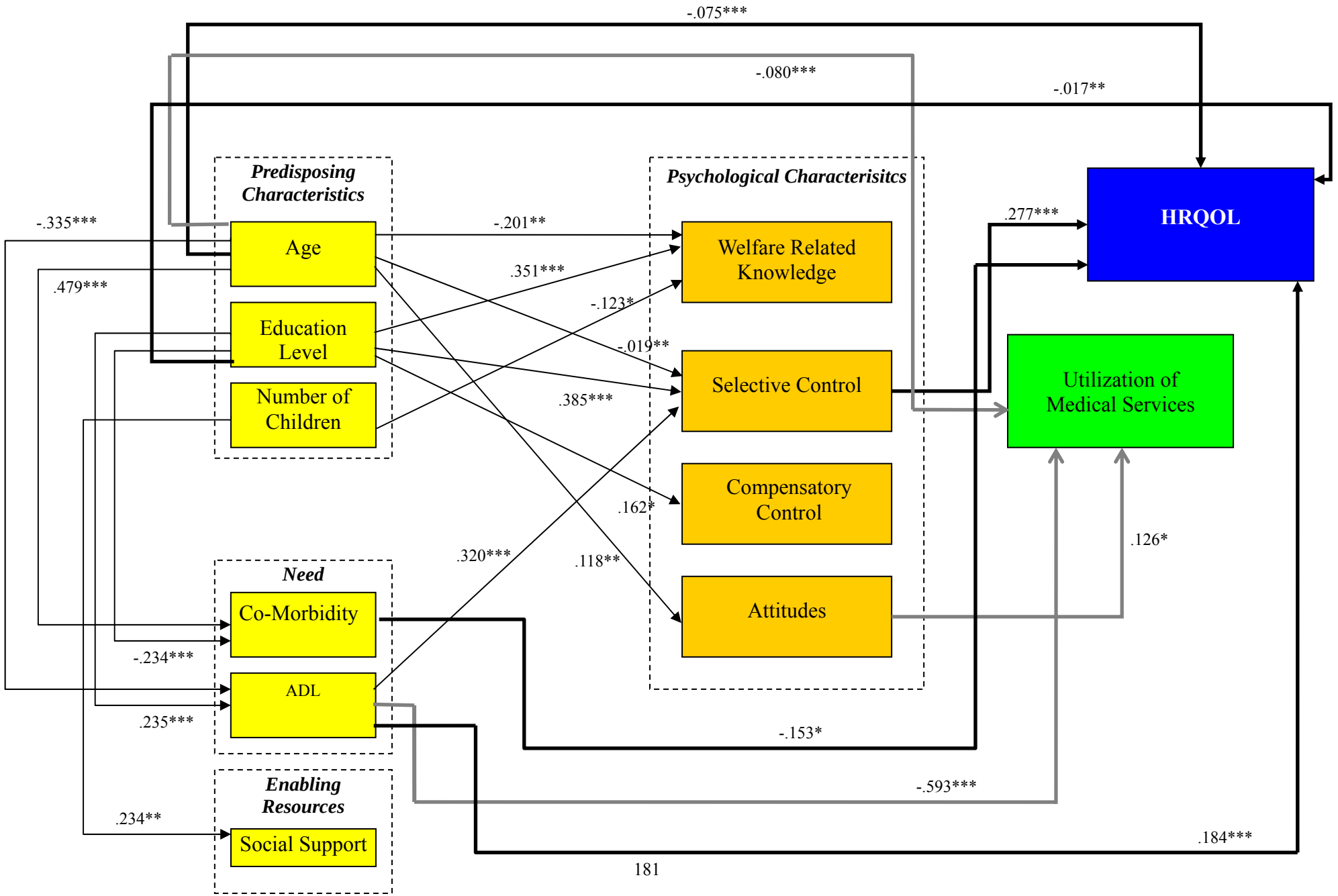

Figure 13. Path Model Predicting HRQOL, Operated through the Utilization of Medical Services

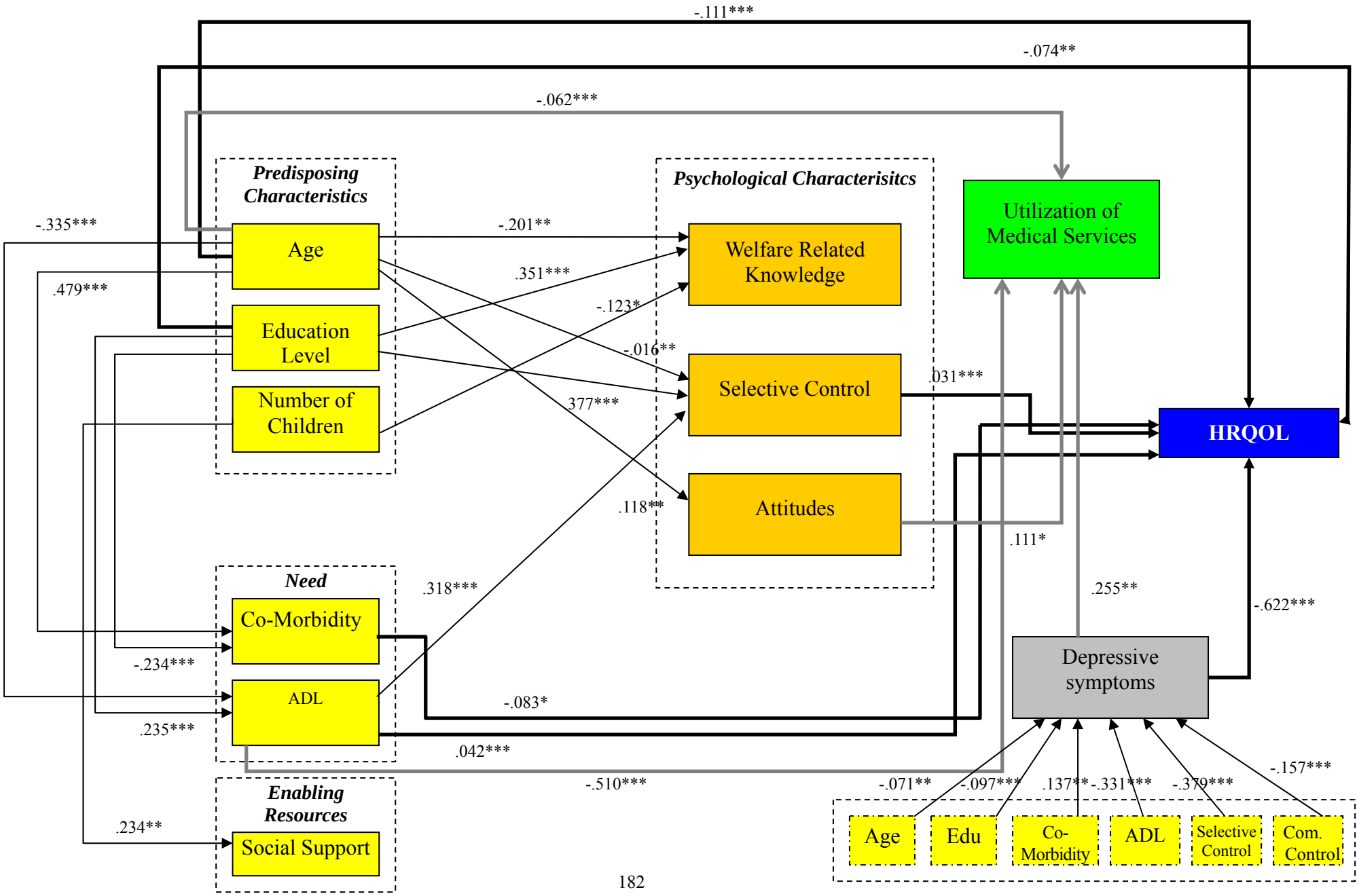

Figure 14. Path Model Predicting HRQOL, Operated through the Utilization of Medical Services and Depressive Symptoms

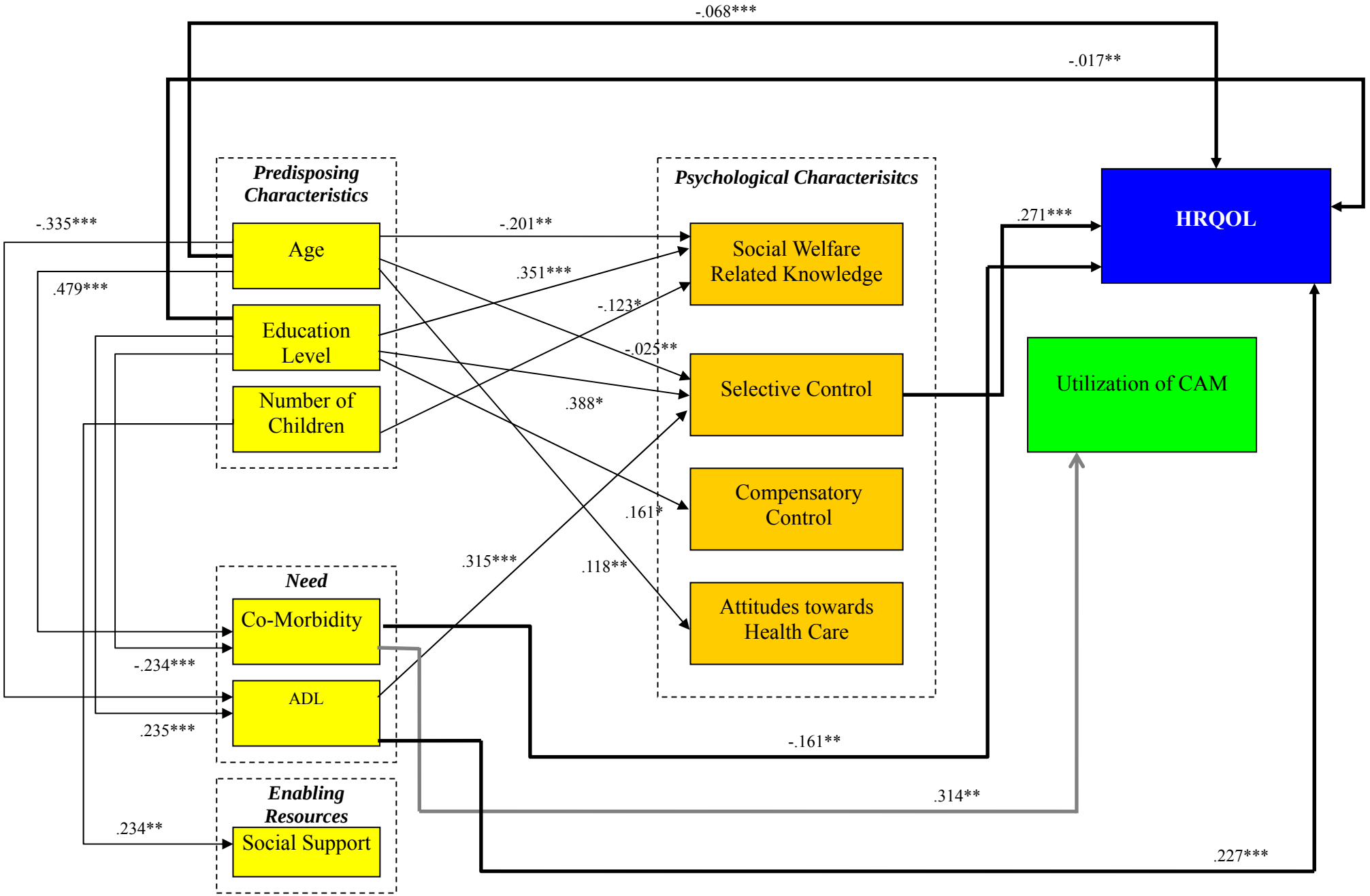

Figure 15. Path Model Predicting HRQOL, Operated through the Utilization of CAM

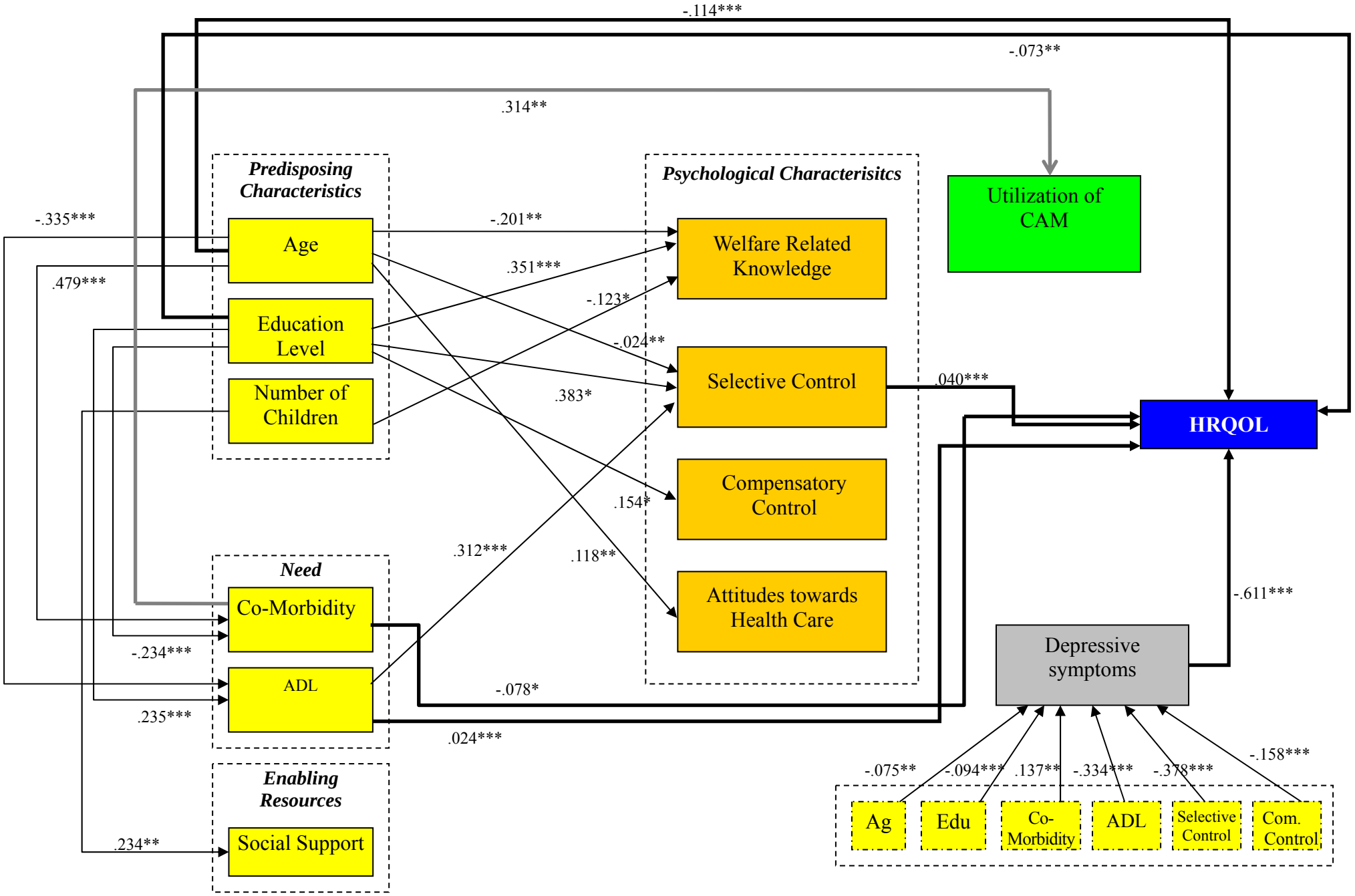

Figure 16. Path Model Predicting HRQOL, Operated through the Utilization of CAM and Depressive Symptoms

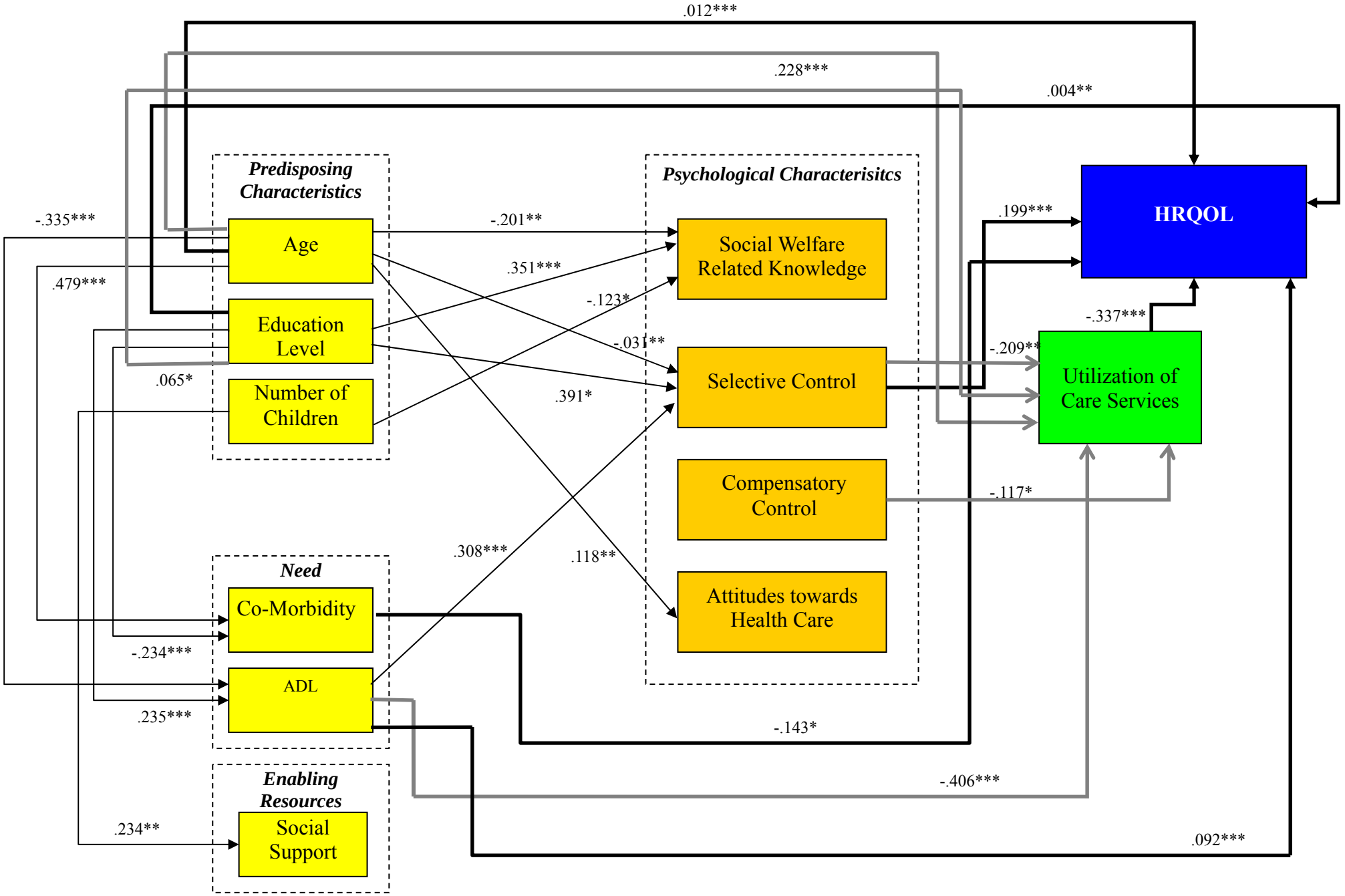

Figure 17. Path Model Predicting HRQOL, Operated through the Utilization of Care Services

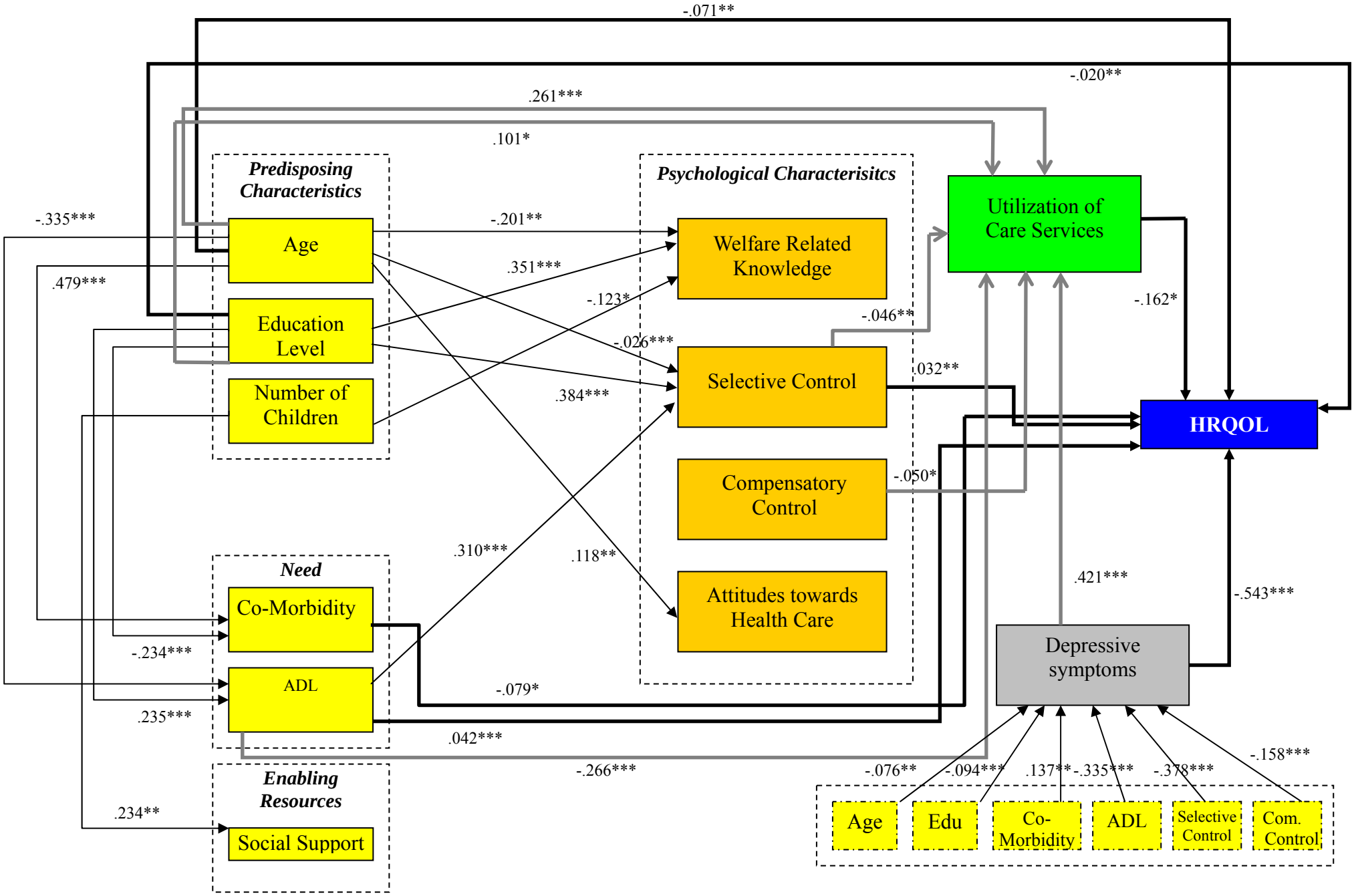

Figure 18. Path Model Predicting HRQOL, Operated through the Utilization of Care Services and Depressive Symptoms

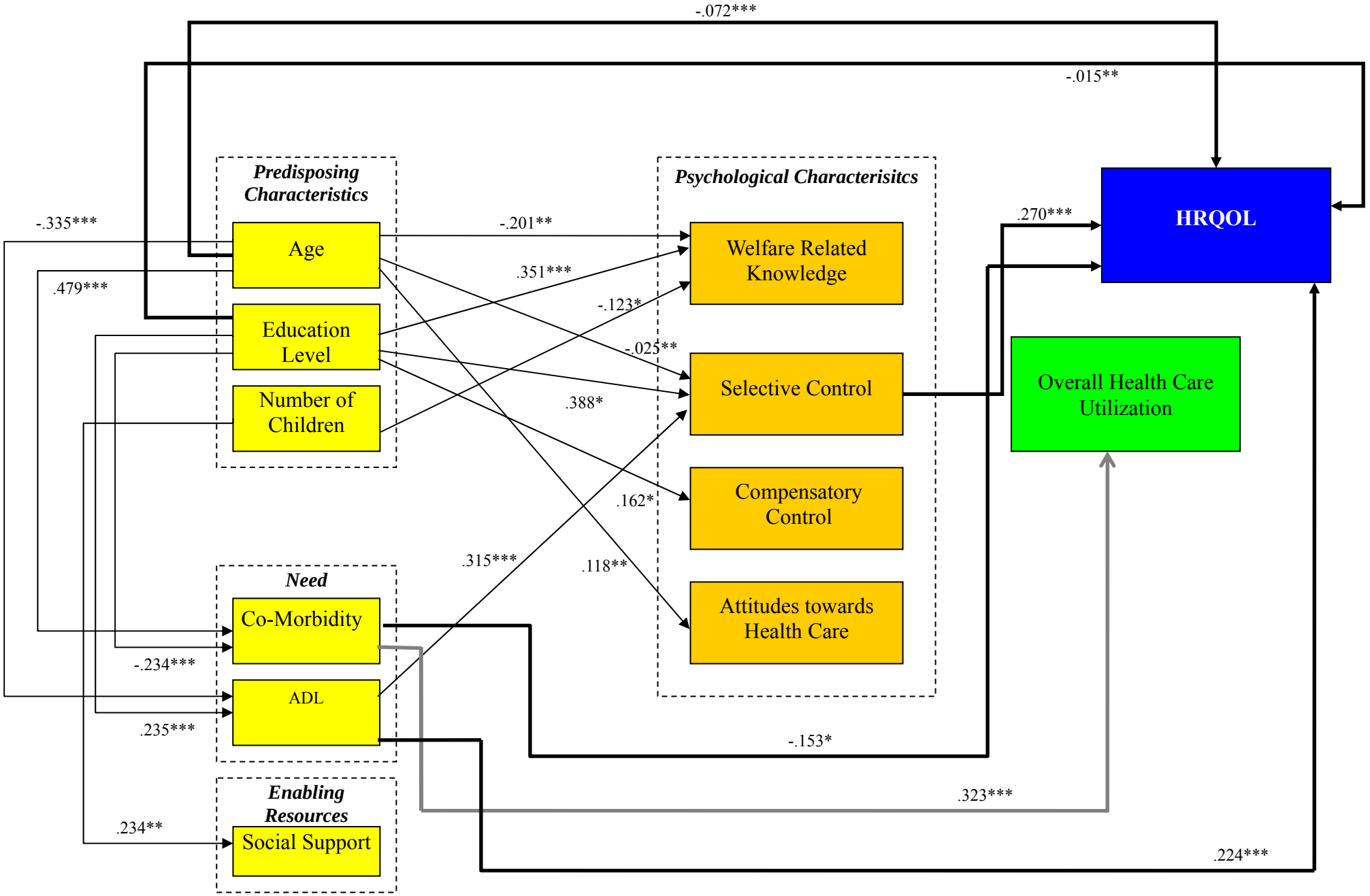

Figure 19. Path Model Predicting HRQOL, Operated through Overall Health Care Utilization

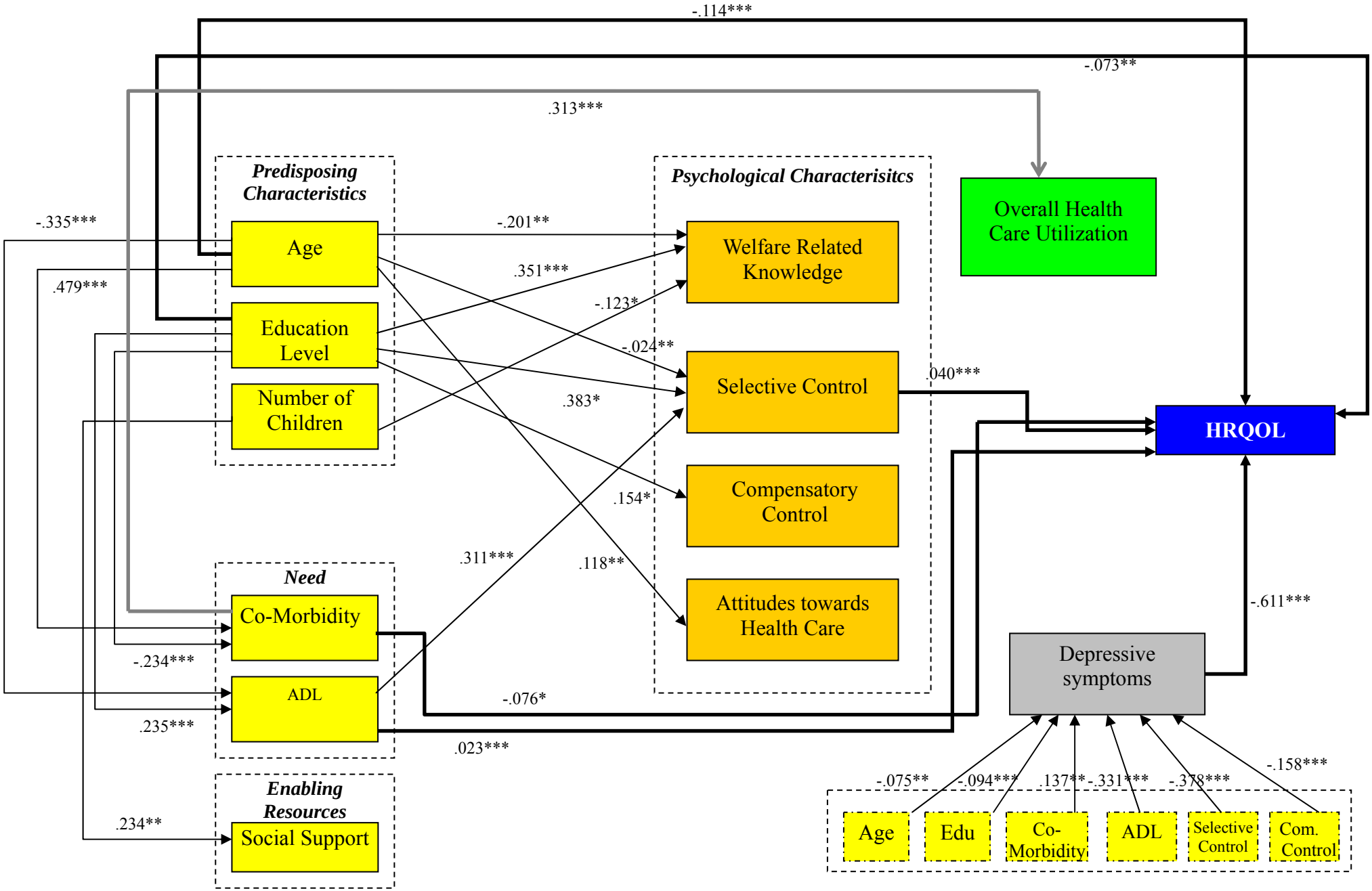

Figure 20. Path Model Predicting HRQOL, Operated through Overall Health Care Utilization and Depressive Symptoms

Table 1. List of International Studies Focusing on Health Care Utilization of Individuals with Parkinson's Disease

Author(s)	Study Sample	Study Method	Study Results
I. Utilization by Cost			
Cordato et al. (2006)	12 patients with PD and 12 age-matched healthy controls	3-month diary study	Mean total annual costs were 7,020 Australian dollars (about USD 6,041) per patient. Medication was the most costly component.
Dodel et al. (1998)	20 German patients with PD & 20 patients with other neurological diseases	3-month-Observation survey	The mean 3-month medical cost of PD was USD 3,390. The expenditure was related to the disease progression. Treatments for early stage (HY 1) patients were less expensive (1,250 USD) than medical costs of patients in late stage (HY 5) (6,330 USD).
Findley et al. (2003)	432 British patients with PD	Survey	Mean total annual health care expenditures were £5,993 per patient. Disease severity significantly influenced expenditure. Drug expenditure accounted for 24% of overall costs in the 65 + years age group and 10% in patients aged over 85 years.
Findley (2007)	432 British patients with PD	Survey	Mean total annual costs was between 449 million pounds and 3.3 billion pounds. Among direct costs, the highest expenditures were inpatient care and nursing home costs. Among indirect costs, losing productivity and caregiver burden tended to be high.
Hagell et al. (2002)	127 Swedish patients with PD	Patients' medical records during 1 year (1996) and a mailed questionnaire	Mean total annual costs for PD were USD 12,400 per patient. The estimated annual direct health care costs were USD 2,900 per patient. Medication was the most costly component. Non-medical direct costs (USD 4,300) were higher than direct health care costs.
Huse et al. (2005)	20,016 U.S. patients with PD	Medstat's MarketScan Research Databases	Mean total annual direct costs were USD 23,101 per patient. The estimated annual indirect costs were USD 25,326. The total cost to the nation is projected to be USD 23 billion annually.
LePen et al. (1999)	294 French patients with PD	6-month observation	Hospital stays were the most expensive component of care (39% of costs), followed by ancillary care (30%) and drug therapy (22%). The mean medical cost was € 308 (USD 357) for patients followed by a general practitioner and € 2,580 (USD 2,993) for patients followed by neurologists.
Lindgren et al. (2005)		Literature review	Mean total direct costs of PD were €3,360 for UK (2002), €4,900 for Finland (2003), €7,920 for Sweden (2003) and €8,160 for Germany (2005).

Table 1, continued (page 2 of 5)

Author(s)	Study sample	Study Method	Study Results
Orsini et al. (2004)	11,882 U.S. patients with PD	Medstat's MarketScan Research Databases	Mean total annual health care expenditures were USD 18,586 per patient. Average annual inpatient hospitalization costs were USD 8,921, while long term nursing home care expenditures accounted for USD 31,434.
Spottke et al. (2005)	145 German patients with PD	6- month observation study	Mean total annual direct costs were estimated to be €3380 +/- €4230.Mean direct medical costs approximated €1370 +/- €3240, non-medical direct costs €480 +/- €1710. Results derived from bivariate analyses identified motor complications, falls, disease severity and dementia as predictors for direct costs. However, multivariate analyses suggested disease severity and health-related quality of life as significant predictors.
Wang et al. (2006)	190 Chinese patients with PD	1-year interview survey	Mean annual costs for PD in China were approximately USD 925. Direct medical care costs approximated USD 519 per patient, non-medical direct costs USD 398, costs due to loss of productivity USD 8.8.
Winter et al. (2010a)	145 German patients with PD	12-month observation	Mean annual costs totalled €20,095 per patient. Amongst direct costs, the highest expenditures (€13,158) were for drugs (€3,526) and inpatient care including nursing homes (€3,789).
Zhao et al. (2011)	195 patients with PD in Singapore	Survey	Mean annual total costs of PD were USD10,129 per patient, with direct cost accounted for 38.5% and indirect cost 61.5%. Higher education, younger age and longer duration of PD were associated with higher total cost.
II. Utilization by Frequency			
Cosentino et al. (2005)	130 Italian patients with PD	Rretrospective, cross-sectional survey	70.8% of 130 patients used medical health care services: 1/5 of the patients used in-patient stay, 1/5 emergency room, 2/5 were visited by a non-neurology specialist, and 1/4 by the GP. Injuries and muscular-skeletal diseases were the main reasons of health care utilization.
Escudero-Torrella (1997)	63 Spanish out-patients with PD	Retrospective study	First visits to the hospital outpatient department were 0.12/1,000 inhabitants/year and 2.25/1,000 for second visits. Inpatient stay made up 1.37% of all neurology admissions and 0.04% of the total hospital admissions.
III. Utilization by Service Type			
Nijkrake et al. (2007)		Literature review	The need of allied health care and complementary therapies of patients with PD is discussed.
MacMahon (1999)			An integrated multidisciplinary PD service that incorporates nurse specialists can offer support at the individual level.

Table 1, continued (page 3 of 5)

Author(s)	Study sample	Study Method	Study Results
Goy, Carter, & Ganzini (2008)	52 American caregivers of patients with PD & 50 caregivers of ALS patients		In the views of caregivers, suffering associated with PD was more severe than suffering associated with ALS (Amyotrophic lateral sclerosis). Unmet palliative care needs in the last months of life were found among both of the patient groups.
Hurwitz et al. (2005)	1859 British patients with PD	Survey	Nurse specialists in PD could not improve the clinical condition of patients, however they had positive effects on increasing patients' sense of wellbeing.
Kluding & Quinn McGinnis (2006)	2 American Patients with PD	Case study	Fitness programs were associated with improvements in functional reach, Timed Up and Go, and Berg Balance scores.
Leentjens et al. (2008)	Patients with PD who used mental health care	Record linkage study	After diagnosing PD, the relative risk for mental health care use was increased. This increase was higher for women than for men, and higher for younger than older individuals.
Macht et al. (2007)	151 Patients with PD from 7 European countries, who attended patient education programs		Patient education programs had impacts on reducing disease-related psychosocial problems of patients. No substantial differences in results between cultures were found.
Nieuwboer et al. (2001)	33 American Patients with PD, who received a home physiotherapy program	Within-subject controlled design	Treatments in the home setting could improve functional activities. Results suggested that physiotherapy was best provided in the home situation.
Pacchetti et al. (2000)	32 Italian Patients with PD	Prospective, controlled, single-blinded study	Music therapy was associated significantly with improvement on ADLs , motor and affective functions.
Parashos, Maraganore, O'Brien, & Rocca (2002)	89 Patients with PD and 89 subjects without PD	Rochester Epidemiology Project	Patients with PD used outpatient and nursing home services more often than subjects without PD. Demographic and clinical characteristics were associated with utilization patterns and outcomes.
Samii et al. (2006)	34 American Patients with PD		Telemedicine can be used effectively for follow-up visits with patients with PD.
Shimbo et al. (2004)	762 Japanese Patients with PD	Cross-sectional study	Patient education programs were associated with better HRQOL, however had less effects on reducing bodily pain or improving physical functioning.
Sunvisson et al. (2001)	43 Sweden Patients with PD		Patient education programs were associated with better psychosocial well-being and mobility improvement. However, these improvements were not transferred to daily life.

Table 1, continued (page 4 of 5)

Author(s)	Study sample	Study Method	Study Results
Sunvisson & Ekman (2001)	Swedish patients with PD		After a 2-year mountain walking program, individuals' perceptions of the manageability of their experienced sicknesses could be changed.
Wade et al. (2003)	94 Patients with PD who received rehabilitation for 6 months	Controlled crossover comparison study	Short-term multidisciplinary rehabilitation may improve mobility of patients with PD.
IV. Utilization by Determinants			
Chen, Kales, & et al. (2007)	41,162 American veterans	Veterans Affairs National Databases	18.5% of patients with PD were diagnosed with depression. Depression in PD was associated with greater psychiatric problems, medical co-morbidity and greater health care utilization.
de Boer, Spranger, Speelman, & de Haes (1999)	235 Dutch patients with PD	1-year-period study	Visits to a neurologist was not associated with disease severity or QoL among patients with PD, but with socio-demographic characteristics. Non-medical care is predicted by disease severity and psychosocial characteristics.
Dodel, Berger, & Oertel (2001)		Literature review	Due to multiple drugs and high dosages, patients with motor complications had an increasing need in health care utilization. Comparing with patients without motor fluctuations and dyskinesias, patients with these symptoms had increasing health care costs.
Fujii & Masuda (2007)	Japanese patients with PD given in-home care	Survey (1995/2004)	Participants reported a higher disease severity and difficulties with daily life.
Low (2004)	Canadian patients with PD	Semi-structured interviews	The disease management of patients with PD is discussed.
Murman, Kuo, Powell, & Colenda (2003)	148 patients with Alzheimer's disease (AD) and no PD, patients with AD and PD, and patients with dementia with Lewy bodies	Cross-sectional study	Patients with AD and PD had significantly higher formal and total direct costs of care than patients with AD.
Parashos, Maraganore, O'Brien, & Rocca (2002)	89 Patients with PD and 89 subjects without PD	Rochester Epidemiology Project (1979-1988)	Response to dopaminergic medications and higher education predicted more physician consultations among patients. Poor response to medications, lower education level, older age at onset of PD, and dementia predicted a shorter time between onset and nursing home placement. Demographic and clinical characteristics influenced utilization patterns and outcomes.

Table 1, continued (page 5 of 5)

Author(s)	Study sample	Study Method	Study Results
Pechevis et al. (2005)	Patients with PD in France, Germany & UK	6-month observational study	Dyskinesia may adversely affect QOL and increase health care costs in patients with PD.
Pressley et al. (2003)	791 U.S. patients with Parkinsonism	Secondary data analysis	Among those with parkinsonism, co-morbidity cost ratios demonstrated two- to threefold higher cost for dementia, broken bones, broken hip, and diabetes. Co-morbidity associated with parkinsonism is related to higher resource use and expenditures.
Vargas, Carod-Artal, Nunes, & Melo (2008)	144 Brazilian Patients with PD	Cross-sectional survey	Utilization of healthcare resources was influenced by functional status and co-morbid conditions.

Table 2. Design of the Draft Questionnaire: Variables and Definitions

	Variables	***Definitions***
Health Care Utilization		
Utilization of Medical Services	Emergency rooms	Attendances in emergency rooms over the past 2 years
	Hospitalization	Inpatient stays; stays overnight or longer at clinics over the past 2 years
	Outpatient visits	Attendances at clinics or hospitals, others than as an inpatient over the past 3 months
	Rehabilitation	Consultation by a physiotherapist because of PD over the past 3 months
	Utilization of "chronic illness prescription refill slip" (CIPRS)	Whether participants become the 'chronic illness prescription refill slip' due to PD over the past 3 months or not
Utilization of CAM	Utilization of alternative therapy	Consultation by a alternative medicine provider because of PD over the past 3 months
	Utilization of supplemental health food	Use of any supplemental health food over the past 3 months because of PD
	Utilization of supportive devices	Use any supportive devices such as canes or wheelchairs over the past 3 months because of PD
Utilization of Care Services	Utilization of foreign domestic worker	Informal care provided by foreign domestic worker over the past 3 months
	Utilization of family care	Informal care provided by family member(s) over the past 3 months
	Utilization of social care	Whether participants have become any social care services over the past 3 months because of PD
Predisposing Characteristics	Age	The actual age in years
	Gender	Male and female groups
	Education level	The educational level of the participants
	Marital status	A legally recognized civil partnership
	The number of children	The number of children
	Living arrangements	Information about cohabiting
Need	Disablility	Disability relating to *ADL* and *IADL*
	Disease severity	Disease severity based on *UPDRS*
	Disease duration	The actual duration in years after the diagnosis of PD
	Co-Morbidity	Number of other diseases which participants have totally
Enabling Resources	Household expenditure	The total amount for the household monthly
	Ownership of the 'handicapped ID'	Ownership of the 'handicapped ID' due to mental and/or physical disabilities
	Social support	Perceived support (from family, friends and neighbors) for use of health care services
Psychological Characteristics	Disease-related knowledge	Participants' knowledge about the necessity of regular doctor visits and medication due to PD
	Social welfare related knowledge	Participants' knowledge about the 'handicapped ID', health insurance subsidy and social care services due to PD
	Attitudes towards health care	An index based on Andersen (1973), participants' perception towards health care services
	The social norms	referent, who is mostly involved in the processes of health care utilization
	Selective/compensatory control	adapted from *Health Engagement Control Strategy* (Wrosch, Schulz, & Heckhausen, 2002)

Table 3. Items and Scales Used in the Development of the Draft Questionnaire

Item	*Source*	*Number of items*
Predisposing Characteristics		
	adapted from the *health care utilization studies in people with intellectual disabilities in Taiwan* (Lin et al., 2005; 2007)	6
Need		
IADL	adapted from Lawton & Brody (1969)	8
Disease severity	adapted from the *UPDRS*	55
Disease duration	self-developed	1
Co-Morbidity	A check-list with 14 chronic disease; developed from Lin et al. (2005; 2007)	15
Enabling Resources		
Social support	adapted from the *MOS Social Support Survey*	19
Ownership of the Handicapped ID	adapted from Lin et al. (2005; 2007)	3
Self-evaluated economic status and household expenditure	1 item adapted from the *OASIS Study* (Lowenstein & Ogg, 2003) 1 item adapted from Lin et al. (2005; 2007)	2
Psychological Characteristics		
Disease-related knowledge	self-developed	2
Social welfare related knowledge	developed from Lin et al. (2005; 2007)	3
Attitudes towards health care services	adapted from Andersen (1976)	3
Social norms	self-developed, based on Bradley et al. (2002)	1
Perceived control	adapted from *Health Engagement Control Strategy* (Wrosch, Schulz, & Heckhausen, 2002)	12
Health Care Utilization		
Utilization of medical services	developed from *PD MED*	6
Utilization of alternative therapy	adapted from *PD MED*	1
Utilization of health food	self-developed	1
Utilization of supportive devices	adapted from Lin et al. (2005; 2007)	1
Utilization of social care	developed from *PD MED*	1
Utilization of family care	developed from *PD MED*	2
Depressive Symptoms		
	adapted from *CES-D*	10
HRQOL		
Health-related quality of life	• adapted from the Chinese Version of *PDQ-8* (Tan, Lau, Au, & Luo, 2007) • adapted from *SF-12*	8 12

Table 4. Items and Scales Used in the Final Questionnaire

Item	*Source*	*Number of items*
Predisposing Characteristics		
	adapted from Lin et al. (2005; 2007)	6
Need Level		
ADL	*Bethel Index* (Mahoney & Barthel, 1965) (assessed by the author)	(10)
IADL	adapted from Lawton & Brody (1969)	8
Disease severity	adapted from the *Hoehn-Yahr Scale*	1
Disease duration	self-developed	1
Co-Morbidity	A check-list with 14 chronic disease (Lin et al., 2005; 2007)	2
Enabling Resources		
Social support	adapted from the *MOS Social Support Survey* (partial)	5
Ownership of the Handicapped ID	adapted from Lin et al. (2005; 2007)	3
Self-evaluated economic status	1 item adapted from the *OASIS* Study (Lowenstein & Ogg, 2003); 1 item adapted from Lin et al. (2005; 2007)	2
Psychological Characteristics		
Disease-related knowledge	self-developed	3
Social welfare related knowledge	developed from Lin et al. (2005; 2007)	3
Attitudes towards health care services	adapted from Andersen (1976)	3
The social norms	self-developed, based on Bradley et al. (2002)	1
Perceived control	adapted from *Health Engagement Control Strategy* (Wrosch, Schulz, & Heckhausen, 2002)	12
Health Care Utilization		
Utilization of medical services	developed from *PD MED*	6
Utilization of alternative therapy	adapted from *PD MED*	1
Utilization of supplemental health food	self-developed	1
Utilization of supportive devices	adapted from Lin et al. (2005; 2007)	1
Utilization of family care	developed from *PD MED*	1
Utilization of foreign domestic worker	self-developed	1
Utilization of social care	developed from *PD MED*	1
Depressive Symptoms		
	adapted from *GDS-15* (Yesavage et al., 1983)	15
HRQOL		
	adapted from *SF-12*	12

Table 5. Scale Reliability of IADL, MOS SSS (5 items), PDQ-9, HECS, GDS-15 and SF-12

Scale	*Item Number*	*Cronbach's Alpha*
IADL	8	.88
MOS SSS	5	.80
PDQ-8	8	.95
HECS	12	.91
GDS-15	15	.89
SF-12	12	.86

Table 6. Descriptive Statistics of the Predisposing Characteristics and Enabling Resources among the Study Sample

	N	*M*	*SD*	*%*	Range[a]
Gender					
Male	104			52	
Age	200	75.07	7.47		65–92
Education Level					
Illiterate	37			18.5	
Primary school	46			23	
Junior high school	40			20	
Senior high school	33			16.5	
College degree	44			22	
Marital Status					
married	115			55	
widowed	71			35.5	
single	15			7.5	
The Number of Children		3.16	1.72		0–8
Living Arrangements					
3-Generation Household	112			56	
With Spouse Only	41			20.5	
Alone (community-dwelling)	16			8	
Senior Housing	2			1	
Care Facility or Nursing Home	29			14.5	
Household Expenditure					
< 7999 NT$	3			1.5	
8000–19999 NT$	20			10	
20000–39999 NT$	49			24.5	
40000–59999 NT$	63			31.5	
>60000 NT$	53			36	
No Exact Answer	12			6	
Ownership of the Handicapped ID					
With	49			24.5	
Handicap Level					
Mild	10			20.4	
Moderate	21			42.9	
Severe	15			30.6	
Profound	3			6.1	
Social Support	200	21.11 4.19			

Note. [a] Observed range

Table 7. Descriptive Statistics of the Need Level among the Study Sample

	N	*M*	*SD*	*%*	*Range*[a]
ADL	200	73.17	31.39		0–100
IADL	200	7.17	4.67		0–12
Disease Severity (based on Hoehn & Yahr Scale)	200	2.49	1.49		1–5
1: unilateral involvement	80			40	
2: bilateral involvement	28			14	
3: postural instability	38			19	
4: severly disabled	23			11.5	
5: restricted to bed or wheelchair	31			15.5	
Co-Morbidity (number of chronic disorders)					
0	42			21	
1	35			17.5	
2	29			14.5	
3	42			21	
4	27			13.5	
>=5	25			12.5	
Disease Duration (years)	199	6.51	4.96		0–20
< 1 year	10			5	
= 1 year	28			14.1	
2 – 5 years	55			27.63	
6 – 10 years	67			33.67	
11 –15 years	33			16.58	
15–20 years	6			3.01	

Note. [a] Observed range

Table 8. Responses on Perceived Control (by percentage)

Item	*Item mean*	*Never %*	*Selten %*	*Some-times%*	*Often %*	*Always %*
1. I invest as much time and energy as possible to improve my health.	2.15	9.5	21.0	23.5	36.5	9.5
2. Even if my health is in very difficult condition, I can find something positive in life.	2.09	9.0	19.0	31.0	36.0	5.0
3. If I develop a new health problem, I immediately get help from a health professional (e.g., doctor, nurse).	2.54	5.5	13.5	26.0	32.0	23.0
4. When I decide to do something about a health problem, I am confident that I will achieve it.	1.93	12.0	24.0	27.5	32.0	4.5
5. I do whatever is necessary to be as healthy as I possibly can be.	2.17	9.5	19	28.5	31.5	11.5
6. When a treatment doesn't work for a health problem I have, I try hard to find out about other treatments.	2.00	12.5	20.0	29.0	30.0	7.5
7. When I am faced with a bad health problem, I try to look at the bright side of things.	2.15	12.5	18.0	21.5	37.5	10.5
8. Once I decide what I need to do to improve my health, I avoid things that could distract me from doing these things.	1.88	13.0	23.5	31.5	26.5	5.5
9. If I have a health problem that gets worse, I put in even more effort to get better.	2.06	13.5	21.0	22.0	33.0	10.5
10. When I first notice a health problem, I try to get as much advice as I can from people who might know something about the problem.	2.36	7.0	18.0	27.5	26.5	20.5
11. When I find it impossible to overcome a health problem, I try not to blame myself.	2.12	9.5	16.5	34.0	33.0	7.0
12. I often think about how important good health is to me.	2.57	5.5	10.5	26	37.5	20.5

Table 9. Self-reported Health Care Utilization (in Numbers and Percentages)

Health Care Utilization (by Services)	*N*	*Use (%)*	*Non-use (%)*
OPD (Out-patient Services)	200	138	62
		(69)	(31)
ER (Emergency Rooms)	200	45	155
		(22.5)	(77.5)
Hospitalization	200	63	137
		(31.5)	(68.5)
REHAB	200	51	149
		(25.5)	(74.5)
CIPRS	200	125	75
		(62.5)	(37.5)
Alternative Therapy	199	64	135
		(32)	(67.5)
Supportive Devices	200	111	89
		(55.5)	(44.5)
Supplemental Health Food	200	86	114
		(43)	(57)
Family Care	200	96	104
		(48)	(52)
Foreign Domestic Worker	200	46	154
		(23)	(77)
Social Care	200	14	186
		(7)	(93)

Table 10. Spearman Rho Correlation Coefficients between Diverse Types of Health Care Utilization

	Health Care Service	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1.	Hospitalization	—	.105	.344**	.347**	.318**	.194**	.499**	.294**	.490**	-.102
2.	OPD		—	.045	-.430**	-.094	-.095	-.078	-.070	-.027	-.240**
3.	REHAB			—	.358**	.286**	.164*	.316**	-.020	.310**	-.026
4.	CIPRS				—	.374**	.360**	.512**	.178*	.496**	-.030
5.	Alternative Therapy					—	.449**	.381**	.219**	.369**	-.021
6.	Health Food						—	.392**	.269**	.298**	.039
7.	Supportive Device							—	.442**	.578**	.088
8.	Foreign Domestic Worker								—	.236**	-.150*
9.	Family Care									—	-.067
10.	Social Care										—

Note. * p<.05, **p<.01, ***p<.001

Table 11. Pearson's Correlation Coefficients between the Continuous Study Variables

Variable	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1. Age	—	.308**	-.365**	-.449**	.444**	.447**	-.197**	-.067
2. Number of Children		—	-.206**	-.302**	.318**	.302**	-.249**	-.298**
3. ADL			—	**.828****	**-.762****	**-.853****	.533**	.431**
4. IADL				—	**-.765****	**-.831****	.624**	.470**
5. Disease Duration					—	**.895****	-.611**	-.518**
6. Disease Severity (HY stage)						—	-.611**	-.471**
7. Selective Control							—	**.844****
8. Compensatory Control								—

Note.
(1) *p<.05, **p<.01; (2) correlation coefficients (2-tailed)

Table 12. Correlation Coefficients between the Non-Continuous Study Variables

Variable	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
1. Gender	—	-.330**	.296**	.003	-.118	-.022	-.042	.043	.120	-.136	.248**	.159*
2. Education Level		—	-.142*	-.159*	-.179*	.141	-.033	-.272**	-.109	.402**	-.438**	-.173*
3. Marital Status			—	.173*	.013	-.186*	-.086	.253**	.229**	-.062	.172*	.159*
4. Living Arrangement				—	.439**	-.126	.351**	.332**	.127	-.071	.186**	.171*
5. Handicapped ID					—	-.044	.255**	.330**	.112	.131	.286**	.068
6. Household Expenditure						—	.306**	.123	.133	-.136	.007	.119
7. Social Support							—	.114	.084	-.085	.144*	.075
8. Co-Morbidity								—	.368**	-.240**	.432**	.293**
9. Disease-related Knowledge									—	.090	.287**	.533**
10. Social Welfare related Knowledge										—	-.270**	-.084
11. Social Norms											—	.140*
12. Attitudes												—

Note. (1) *p<.05, **p<.01; (2) correlation coefficients (2-tailed)

Table 13. Test of Multicollinearity on the Complete Model Predicting the Utilization of Hospitalization Services

Variable	*Correlations*			*Collinearity Statistics*	
	Zero-order	*Partial*	*Part*	*Tolerance*	*VIF*
Gender	.055	-.051	-.039	.700	1.429
Age	.287	-.003	-.002	.539	1.854
Education Level	-.216	-.021	-.016	.484	2.067
Marital Status	.071	-.015	-.011	.590	1.694
No. of Children	.312	.103	.078	.532	1.879
Living Arrangem.	.232	-.040	-.030	.516	1.936
Household Exp.	.230	.073	.055	.530	1.888
Handicapped ID	.333	.013	.010	.500	1.999
Social Support	.164	.001	.001	.618	1.617
ADL	-.610	-.245	-.190	.169	5.931
IADL	-.530	.054	.041	.167	5.995
Disease Duration	.532	-.005	-.004	.158	6.330
Disease Severity	.590	.101	.077	.104	9.620
Co-Morbidity	.424	.023	.018	.440	2.274
DI. Knowledge	.211	-.027	-.020	.554	1.806
SW. Knowledge	-.120	-.008	-.006	.590	1.696
Attitudes	.220	.048	.036	.531	1.884
Social Norms	.360	.062	.047	.454	2.204
Selective Control	-.341	.102	.077	.166	6.035
Compensatory Control	-.320	-.083	-.063	.213	4.693

Table 14. Test of Multicollinearity on the Reduced Models Predicting the Utilization of Hospitalization Services

Variables Predicting the Utilization of Hospitalization Service Based on the Reduced Model (I)

Variable	*Correlations*			*Collinearity Statistics*	
	Zero-order	*Partial*	*Part*	*Tolerance*	*VIF*
Gender	.057	-.048	-.037	.712	1.404
Age	.274	-.012	-.009	.587	1.703
Education Level	-.210	-.024	-.018	.502	1.992
Marital Status	.069	-.013	-.010	.662	1.511
No. of Children	.307	.147	.114	.609	1.641
Living Arrangem.	.235	-.035	-.026	.551	1.814
Household Exp.	.224	.077	.059	.558	1.793
Handicapped ID	.326	.006	.004	.529	1.891
Social Support	.160	-.020	-.015	.670	1.493
ADL	-.612	-.401	-.334	.353	2.832
Co-Morbidity	.421	.036	.028	.468	2.135
DI. Knowledge	.207	-.019	-.015	.563	1.778
SW. Knowledge	-.112	.026	.020	.636	1.573
Attitudes	.216	.034	.026	.575	1.740
Social Norms	.350	.056	.042	.494	2.024
Selective Control	**-.342**	**.039**	**.030**	**.450**	**2.223**

Variables Predicting the Utilization of Hospitalization Service Based on the Reduced Model (II)

Variable	*Correlations*			*Collinearity Statistics*	
	Zero-order	*Partial*	*Part*	*Tolerance*	*VIF*
Gender	.055	-.056	-.042	.705	1.419
Age	.287	.002	.002	.580	1.725
Education Level	-.216	-.012	-.009	.494	2.026
Marital Status	.071	-.017	-.013	.640	1.563
No. of Children	.312	.137	.105	.564	1.772
Living Arrangem.	.232	-.026	-.020	.582	1.719
Household Exp.	.230	.090	.069	.556	1.799
Handicapped ID	.333	.012	.009	.510	1.959
Social Support	.164	-.028	-.021	.660	1.516
ADL	-.610	-.381	-.314	.355	2.819
Co-Morbidity	.424	.027	.021	.475	2.104
DI. Knowledge	.211	-.012	-.009	.559	1.787
SW. Knowledge	-.120	.024	.019	.633	1.580
Attitudes	.220	.024	.018	.587	1.705
Social Norms	.360	.056	.043	.506	1.975
Compensatory Control	**-.320**	**-.013**	**-.010**	**.539**	**1.857**

Table 15. Logistic Regression of Variables Predicting the Utilization of Out-Patient Services - Reduced Model I

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	5.314	1.862	203.152		.004	4.971	1.966	144.166		.011	6.705	2.451	816.635		.006	9.120	2.807	9138.056		.001
Gender [a]	.022	.375	1.022	.490-2.132	.953	-.032	.384	.968	.456-2.056	.934	-.132	.394	.876	.405-1.896	.738	-.090	.412	.914	.408-2.049	.827
Age	-.075	.025	.928	.883-.976	**.003****	-.075	.026	.928	.882-.976	**.004****	-.082	.029	.921	.871-.975	**.005****	-.101	.032	.904	.849-.963	**.002****
Education Level	.155	.134	1.167	.898-1.517	.247	.152	.141	1.164	.882-1.537	.282	.176	.146	1.193	.895-1.589	.229	.247	.171	1.280	.916-1.789	.148
Marital Stauts[a]	-.603	.369	.547	.265-1.128	.102	-.539	.388	.583	.272-1.249	.165	-.590	.405	.554	.251-1.227	.145	-.506	.423	.603	.263-1.381	.232
Number of Children	.234	.114	1.264	1.010-1.581	**.040***	.226	.128	1.253	.975-1.612	.078	.242	.131	1.273	.985-1.645	.065	.221	.133	1.247	.961-1.618	.096
Living Arrangement [a]	1.561	.624	4.762	1.403-16.166	**.012***	1.514	.699	4.543	1.154-17.891	**.030***	1.342	.718	3.827	.937-15.636	.062	1.163	.772	3.201	.705-14.522	.132
Houshold Exp.						-.039	.177	.962	.680-1.362	.827	-.087	.185	.916	.637-1.317	.637	-.101	.202	.904	.608-1.343	.616
Handicapped ID [a]						-.171	.459	.843	.343-2.073	.710	-.462	.516	.630	.229-1.734	.371	-.459	.577	.632	.204-1.956	.426
Social Support						.029	.045	1.030	.943-1.125	.512	.027	.045	1.028	.940-1.123	.546	.027	.047	1.027	.936-1.127	.569
ADL											-.011	.009	.989	.972-1.005	.186	-.015	.010	.985	.967-1.003	.110
Co-Morbidity											-.053	.128	.948	.739-1.217	.677	-.015	.135	.985	.757-1.283	.913
DI. Knowledge																-.291	.139	.748	.569-.983	**.037***
SW. Knowledge																-.074	.104	.929	.758-1.139	.478
Attitudes																.123	.105	1.131	.921-1.388	.241
Social Norms[a]																.715	.540	2.044	.710-5.888	.185
Selective Control																.049	.044	1.050	.964-1.144	.260
	R^2_{CS}=.105, R^2_N=.147					R^2_{CS}=.108, R^2_N=.151					R^2_{CS}=.116, R^2_N=.164					R^2_{CS}=.153 , R^2_N=.215				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 16. Logistic Regression of Variables Predicting the Utilization of Out-Patient Services - Reduced Model II

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	5.707	1.894	300.841		.003	5.358	1.997	212.207		.007	7.530	2.551	1863.864		.003	10.191	2.925	26671.02		<.001
Gender [a]	-.064	.380	.938	.445-1.977	.867	-.142	.390	.868	.404-1.865	.716	-.273	.403	.761	.346-1.677	.498	-.237	.421	.789	.345-1.802	.573
Age	-.081	.026	.922	.876-.970	**.002****	-.083	.027	.921	.874-.970	**.002****	-.091	.030	.913	.861-.968	**.002****	-.112	.033	.894	.838-.954	**.001****
Education Level	.161	.136	1.174	.900-1.532	.237	.146	.144	1.157	.872-1.535	.313	.173	.151	1.189	.885-1.597	.251	.231	.176	1.259	.892-1.777	.190
Marital Stauts[a]	-.549	.373	.578	.278-1.200	.141	-.464	.395	.629	.290-1.364	.241	-.512	.417	.599	.265-1.356	.219	-.402	.433	.669	.286-1.563	.353
Number of Children	.261	.116	1.298	1.033-1.630	**.025***	.246	.130	1.278	.990-1.650	.059	.270	.134	1.309	1.007-1.703	**.044***	.284	.139	1.328	1.012-1.743	**.041***
Living Arrangement [a]	1.592	.630	4.912	1.428-16.895	**.012***	1.569	.707	4.802	1.202-19.186	**.026***	1.393	.725	4.028	.972-16.692	.055	1.302	.763	3.676	.824-16.407	.088
Houshold Exp.						-.029	.178	.971	.685-1.376	.868	-.087	.187	.917	.636-1.323	.643	-.107	.204	.899	.602-1.342	.602
Handicapped ID [a]						-.269	.468	.764	.305-1.911	.565	-.633	.530	.531	.188-1.501	.233	-.645	.604	.525	.161-1.713	.285
Social Support						.035	.046	1.036	.947-1.134	.443	.033	.046	1.033	.943-1.132	.481	.032	.049	1.033	.939-1.136	.508
ADL											-.014	.009	.986	.969-1.003	.112	-.018	.010	.982	.963-1.001	.060
Co-Morbidity											-.080	.130	.923	.716-1.191	.539	-.064	.135	.938	.721-1.221	.635
DI. Knowledge																-.295	.142	.744	.563-.984	**.038***
SW. Knowledge																-.061	.106	.941	.764-1.158	.564
Attitudes																.098	.106	1.103	.895-1.359	.358
Social Norms[a]																.664	.540	1.943	.674-5.596	.219
Compensatory Control																.062	.046	1.064	.973-1.164	.175
	R^2_{CS}=.112, R^2_N=.157					R^2_{CS}=.116, R^2_N=.163					R^2_{CS}=.129, R^2_N=.181					R^2_{CS}=.168, R^2_N=.236				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 17. Logistic Regression of Variables Predicting the Utilization of Emergendy Rooms - Reduced Model I

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-4.001	2.168	.018		.065	-3.974	2.337	.019		.089	1.371	3.061	3.941		.654	1.001	3.391	2.722		.768
Gender [a]	-.801	.475	.449	.177-1.138	.092	-.635	.491	.530	.202-1.386	.195	-.870	.525	.419	.150-1.174	.098	-1.083	.546	.339	.116-.988	**.047***
Age	.016	.029	1.017	.961-1.075	.567	.008	.030	1.008	.949-1.070	.797	-.032	.037	.968	.900-1.041	.386	-.055	.040	.946	.875-1.023	.167
Education Level	-.212	.169	.809	.581-1.126	.208	-.180	.182	.835	.585-1.192	.321	-.042	.201	.959	.647-1.421	.834	-.030	.220	.970	.631-1.492	.891
Marital Stauts[a]	.784	.459	2.189	.890-5.382	.088	.912	.480	2.490	.971-6.383	.058	.710	.522	2.034	.731-5.658	.174	.714	.543	2.041	.704-5.918	.189
Number of Children	.473	.147	1.605	1.204-2.140	**.001****	.448	.162	1.566	1.139-2.152	**.006****	.469	.171	1.598	1.143-2.234	**.006****	.483	.178	1.621	1.143-2.299	**.007****
Living Arrangement [a]	2.245	.536	9.438	3.298-27.009	**<.001*****	1.932	.659	6.905	1.897-25.133	**.003****	1.366	.717	3.920	.961-15.982	.057	1.217	.804	3.376	.699-16.308	.130
Houshold Exp.						.216	.225	1.241	.798-1.928	.338	.031	.248	1.031	.635-1.675	.902	.033	.261	1.034	.620-1.723	.898
Handicapped ID [a]						1.187	.515	3.279	1.195-8.998	**.021***	.274	.613	1.315	.396-4.373	.655	-.172	.678	.842	.223-3.181	.800
Social Support						-.031	.058	.970	.865-1.087	.597	-.029	.063	.971	.859-1.099	.646	-.034	.067	.967	.848-1.103	.614
ADL											-.026	.010	.974	.955-.993	**.008****	-.030	.012	.971	.949-.993	**.010****
Co-Morbidity											.099	.162	1.104	.803-1.518	.542	.185	.171	1.203	.861-1.683	.279
DI. Knowledge																-.216	.165	.806	.583-1.113	.190
SW. Knowledge																.153	.133	1.165	.898-1.512	.251
Attitudes																.139	.142	1.149	.870-1.517	.328
Social Norms[a]																1.954	.954	7.056	1.087-45.809	**.041***
Selective Control																.067	.057	1.070	.957-1.196	.237
	R^2_{CS}=.226, R^2_N=.344					R^2_{CS}=.252, R^2_N=.384					R^2_{CS}=.295, R^2_N=.449					R^2_{CS}=.321, R^2_N=.488				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 18. Logistic Regression of Variables Predicting the Utilization of Emergency Rooms – Reduced Model II

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-4.026	2.165	.018		.063	-4.122	2.336	.016		.078	1.091	3.063	2.978		.722	.602	3.407	1.826		.860
Gender [a]	-.869	.483	.419	.163-1.081	.072	-.703	.501	.495	.186-1.321	.160	-.910	.534	.403	.142-1.146	.088	-1.078	.555	.340	.115-1.008	.052
Age	.018	.029	1.018	.962-1.077	.540	.009	.031	1.009	.951-1.072	.762	-.030	.037	.971	.903-1.044	.426	-.042	.040	.959	.886-1.038	.303
Education Level	-.226	.169	.798	.572-1.112	.183	-.189	.184	.827	.577-1.187	.303	-.053	.202	.949	.638-1.410	.795	.013	.223	1.013	.654-1.569	.954
Marital Stauts[a]	.843	.462	2.323	.939-5.746	.068	.963	.486	2.619	1.011-6.784	**.047***	.751	.529	2.119	.752-5.971	.155	.664	.552	1.942	.658-5.735	.230
Number of Children	.476	.147	1.610	1.206-2.149	**.001****	.445	.162	1.561	1.135-2.146	**.006****	.467	.170	1.596	1.142-2.228	**.006****	.461	.183	1.585	1.107-2.270	**.012***
Living Arrangement [a]	2.197	.539	8.997	3.131-25.854	**<.001*****	1.870	.662	6.486	1.771-23.759	**.005****	1.350	.716	3.856	.947-15.699	.060	1.490	.780	4.439	.963-20.463	.056
Houshold Exp.						.224	.225	1.251	.805-1.945	.319	.044	.247	1.045	.644-1.697	.858	.102	.267	1.107	.656-1.870	.703
Handicapped ID [a]						1.186	.524	3.273	1.172-9.138	**.024***	.311	.618	1.364	.407-4.578	.615	-.175	.697	.840	.214-3.289	.802
Social Support						-.026	.059	.974	.867-1.094	.655	-.027	.064	.973	.859-1.102	.670	-.033	.068	.967	.847-1.104	.621
ADL											-.026	.010	.975	.956-.994	**.011***	-.023	.011	.977	.957-.998	**.036***
Co-Morbidity											.088	.164	1.092	.793-1.506	.589	.131	.169	1.140	.819-1.587	.438
DI. Knowledge																-.192	.162	.826	.601-1.134	.236
SW. Knowledge																.150	.135	1.161	.892-1.512	.266
Attitudes																.087	.135	1.091	.838-1.420	.518
Social Norms[a]																1.765	.933	5.841	.938-36.351	.059
Compensatory Control																-.004	.061	.996	.884-1.122	.942
	R^2_{CS}=.232, R^2_N=.351					R^2_{CS}=.258, R^2_N=.390					R^2_{CS}=.297, R^2_N=.450					R^2_{CS}=.317, R^2_N=.480				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 19. Logistic Regression of Variables Predicting the Utilization of Hospitalization Services – Reduced Model I

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-6.417	1.972	.002		.001	-7.195	2.211	.001		.001	.285	2.857	1.330		.921	.083	3.082	1.087		.978
Gender [a]	-.110	.404	.895	.406-1.977	.785	.028	.431	1.028	.442-2.391	.949	-.211	.475	.809	.319-2.053	.656	-.290	.484	.748	.290-1.930	.548
Age	.062	.026	1.064	1.011-1.119	**.016***	.051	.028	1.052	.997-1.111	.066	.006	.034	1.006	.942-1.075	.848	-.006	.036	.994	.926-1.067	.871
Education Level	-.205	.144	.814	.614-1.081	.155	-.229	.159	.796	.583-1.086	.149	-.025	.181	.975	.684-1.390	.889	-.060	.206	.941	.628-1.411	.770
Marital Stauts[a]	.291	.397	1.337	.614-2.914	.465	.547	.431	1.728	.742-4.023	.205	.196	.500	1.217	.457-3.242	.695	.249	.511	1.282	.471-3.495	.627
Number of Children	.350	.125	1.419	1.111-1.813	**.005****	.247	.142	1.280	.969-1.689	.082	.290	.155	1.336	.985-1.812	.062	.285	.158	1.330	.976-1.812	.071
Living Arrangement [a]	1.332	.501	3.788	1.419-10.111	**.008****	.770	.630	2.159	.628-7.421	.222	-.389	.779	.678	.147-3.119	.617	-.526	.833	.591	.115-3.028	.528
Houshold Exp.						.428	.203	1.535	1.032-2.284	**.035***	.218	.228	1.243	.795-1.945	.340	.212	.239	1.236	.774-1.974	.375
Handicapped ID [a]						1.549	.491	4.707	1.799-12.320	**.002****	.366	.597	1.443	.448-4.649	.539	.154	.633	1.166	.337-4.030	.808
Social Support						-.008	.053	.992	.895-1.100	.882	-.011	.059	.989	.880-1.111	.847	-.014	.061	.986	.874-1.112	.820
ADL											-.047	.011	.955	.935-.975	**<.001*****	-.049	.012	.952	.930-.975	**<.001*****
Co-Morbidity											.037	.157	1.037	.762-1.411	.816	.081	.167	1.084	.782-1.503	.627
DI. Knowledge																-.040	.153	.961	.711-1.297	.793
SW. Knowledge																.078	.125	1.081	.846-1.382	.533
Attitudes																.040	.130	1.041	.807-1.343	.758
Social Norms[a]																.713	.756	2.039	.463-8.975	.346
Selective Control																.045	.055	1.046	.939-1.166	.409
	R^2_{CS}=.188, R^2_N=.266					R^2_{CS}=.253, R^2_N=.357					R^2_{CS}=.360, R^2_N=.507					R^2_{CS}=.365, R^2_N=.515				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 20. Logistic Regression of Variables Predicting the Utilization of Hospitalization Services – Reduced Model II

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-6.527	1.977	.001		.001	-7.529	2.234	.001		.001	-.095	2.867	.909		.974	-.374	3.134	.688		.905
Gender [a]	-.159	.409	.853	.383-1.901	.697	-.030	.438	.970	.411-2.289	.945	-.245	.480	.782	.305-2.005	.609	-.320	.491	.726	.278-1.899	.514
Age	.065	.026	1.067	1.014-1.123	**.013***	.055	.028	1.057	1.000-1.116	**.049***	.010	.034	1.010	.946-1.079	.759	.004	.037	1.004	.934-1.078	.921
Education Level	-.222	.146	.801	.602-1.066	.129	-.239	.161	.787	.574-1.080	.138	-.030	.183	.971	.678-1.389	.871	-.021	.210	.979	.649-1.477	.920
Marital Stauts[a]	.345	.400	1.412	.645-3.092	.388	.608	.438	1.836	.779-4.330	.165	.235	.509	1.265	.466-3.431	.645	.215	.521	1.239	.446-3.443	.681
Number of Children	.348	.125	1.416	1.108-1.811	**.006****	.241	.142	1.273	.963-1.683	.090	.290	.155	1.337	.986-1.812	.061	.276	.163	1.318	.958-1.813	.089
Living Arrangement [a]	1.267	.504	3.551	1.323-9.531	**.012***	.656	.639	1.926	.551-6.736	.305	-.419	.781	.658	.142-3.037	.591	-.311	.805	.733	.151-3.547	.699
Houshold Exp.						.437	.203	1.549	1.040-2.307	**.031***	.230	.227	1.259	.807-1.965	.310	.266	.244	1.305	.809-2.105	.275
Handicapped ID [a]						1.604	.505	4.973	1.849-13.373	**.001****	.453	.607	1.574	.479-5.169	.455	.245	.649	1.278	.358-4.560	.706
Social Support						-.004	.054	.996	.896-1.106	.933	-.012	.060	.988	.878-1.111	.836	-.018	.062	.982	.869-1.110	.772
ADL											-.045	.011	.956	.936-.976	**<.001****	-.043	.012	.958	.936-.980	**<.001*****
Co-Morbidity											.032	.159	1.032	.756-1.410	.841	.040	.164	1.041	.755-1.435	.807
DI. Knowledge																-.027	.154	.974	.720-1.317	.862
SW. Knowledge																.072	.127	1.074	.838-1.377	.572
Attitudes																.017	.129	1.017	.790-1.309	.894
Social Norms[a]																.641	.746	1.899	.440-8.188	.390
Compensatory Control																-.004	.057	.996	.891-1.114	.943
	R^2_{CS}=.196, R^2_N=.275					R^2_{CS}=.263, R^2_N=.370					R^2_{CS}=.362, R^2_N=.509					R^2_{CS}=.365, R^2_N=.514				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 21. Logistic Regression of Variables Predicting the Utilization of CIPRS – Reduced Model I

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-6.977	1.909	.001		<.001	-7.430	2.126	.001		<.001	-4.107	2.581	.016		.112	-7.240	3.108	.001		.020
Gender [a]	.658	.383	1.931	.911-4.094	.086	.721	.393	2.057	.951-4.449	.067	.745	.417	2.106	.930-4.768	.074	.608	.444	1.837	.770-4.383	.170
Age	.101	.027	1.106	1.050-1.166	**<.001*** **	.099	.027	1.104	1.047-1.165	**<.001*** **	.063	.030	1.065	1.004-1.128	**.035***	.065	.035	1.067	.997-1.142	.063
Education Level	-.184	.145	.832	.626-1.105	.203	-.157	.155	.854	.630-1.158	.310	-.057	.163	.945	.686-1.300	.727	-.101	.199	.904	.613-1.335	.612
Marital Stauts[a]	.943	.384	2.568	1.209-5.454	**.014***	1.044	.419	2.841	1.249-6.461	**.013***	.609	.449	1.839	.763-4.434	.175	.597	.475	1.817	.717-4.606	.208
Number of Children	-.082	.124	.921	.722-1.174	.505	-.109	.140	.897	.681-1.180	.437	-.139	.145	.870	.654-1.157	.338	-.163	.156	.849	.626-1.153	.295
Living Arrangement [a]	1.539	.687	4.661	1.213-17.920	**.025***	1.187	.752	3.278	.751-14.312	.114	.599	.787	1.820	.389-8.511	.447	.579	.821	1.784	.357-8.916	.481
Houshold Exp.						.121	.187	1.129	.782-1.631	.517	.027	.201	1.027	.692-1.524	.895	-.066	.213	.937	.617-1.422	.758
Handicapped ID [a]						.889	.492	2.432	.928-6.376	.071	.296	.577	1.344	.434-4.163	.608	.345	.617	1.412	.421-4.734	.576
Social Support						-.005	.048	.995	.906-1.093	.920	.007	.049	1.007	.915-1.107	.892	.015	.051	1.015	.919-1.121	.767
ADL											-.014	.010	.986	.967-1.006	.172	-.013	.011	.987	.965-1.009	.241
Co-Morbidity											.377	.149	1.458	1.088-1.955	**.012***	.300	.158	1.350	.990-1.840	.058
DI. Knowledge																.345	.141	1.412	1.072-1.860	**.014***
SW. Knowledge																-.014	.117	.986	.783-1.242	.906
Attitudes																.104	.113	1.110	.889-1.385	.357
Social Norms[a]																-.469	.551	.626	.212-1.842	.394
Selective Control																-.010	.050	.990	.898-1.091	.834
	R^2_{CS}=.228, R^2_N=.311					R^2_{CS}=.243, R^2_N=.332					R^2_{CS}=.294, R^2_N=.401					R^2_{CS}=.345, R^2_N=.471				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 22. Logistic Regression of Variables Predicting the Utilization of CIPRS – Reduced Model II

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-6.747	1.923	.001		<.001	-7.421	2.144	.001		.001	-3.954	2.633	.019		.133	-7.280	3.186	.001		.022
Gender [a]	.586	.387	1.796	.841-3.836	.131	.622	.398	1.863	.855-4.061	.118	.654	.421	1.923	.843-4.390	.120	.514	.450	1.672	.693-4.036	.253
Age	.098	.027	1.103	1.046-1.163	**<.001*** **	.097	.027	1.101	1.044-1.162	**<.001*** **	.060	.030	1.062	1.002-1.126	**.044***	.067	.035	1.070	.998-1.146	.056
Education Level	-.204	.147	.815	.612-1.087	.164	-.187	.158	.829	.609-1.130	.237	-.079	.167	.924	.666-1.281	.635	-.128	.204	.879	.590-1.311	.528
Marital Stauts[a]	1.042	.391	2.835	1.316-6.104	**.008****	1.179	.433	3.251	1.390-7.600	**.007****	.713	.465	2.040	.820-5.074	.125	.653	.490	1.922	.735-5.025	.183
Number of Children	-.064	.125	.938	.734-1.199	.609	-.106	.142	.899	.681-1.187	.453	-.130	.146	.878	.659-1.170	.375	-.180	.161	.835	.609-1.144	.261
Living Arrangement [a]	1.505	.688	4.502	1.168-17.352	**.029***	1.155	.753	3.175	.726-13.879	.125	.595	.786	1.812	.389-8.455	.449	.612	.815	1.844	.373-9.112	.453
Houshold Exp.						.137	.188	1.147	.793-1.659	.466	.039	.202	1.040	.700-1.544	.847	-.016	.214	.984	.648-1.497	.942
Handicapped ID [a]						.800	.499	2.225	.837-5.910	.109	.216	.587	1.241	.393-3.919	.713	.117	.639	1.124	.321-3.932	.855
Social Support						.007	.049	1.007	.915-1.108	.884	.013	.049	1.013	.919-1.116	.794	.022	.052	1.022	.923-1.132	.674
ADL											-.014	.010	.986	.966-1.006	.160	-.011	.012	.989	.967-1.012	.353
Co-Morbidity											.351	.151	1.420	1.058-1.908	**.020***	.266	.158	1.305	.958-1.777	.092
DI. Knowledge																.347	.141	1.415	1.073-1.866	**.014***
SW. Knowledge																.017	.119	1.017	.805-1.284	.887
Attitudes																.121	.114	1.129	.904-1.410	.286
Social Norms[a]																-.472	.546	.624	.214-1.820	.387
Compensatory Control																-.065	.052	.937	.846-1.038	.215
	R^2_{CS}=.232, R^2_N=.317					R^2_{CS}=.246, R^2_N=.335					R^2_{CS}=.292, R^2_N=.398					R^2_{CS}=.351, R^2_N=.478				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 23. Logistic Regression of Variables Predicting the Utilization of Rehabilitation Services – Reduced Model I

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-3.491	2.091	.030		.095	-3.829	2.264	.022		.091	2.720	2.979	15.186		.361	-.812	3.459	.444		.814
Gender [a]	.685	.437	1.983	.842-4.672	.117	.912	.456	2.489	1.019-6.079	**.045***	.777	.491	2.176	.830-5.701	.114	.595	.518	1.813	.656-5.006	.251
Age	.023	.028	1.023	.969-1.080	.414	.022	.028	1.022	.967-1.081	.438	-.033	.036	.967	.901-1.038	.360	-.054	.039	.947	.877-1.023	.165
Education Level	.109	.153	1.115	.826-1.505	.476	.181	.165	1.198	.868-1.654	.272	.349	.191	1.417	.975-2.059	.067	.269	.225	1.309	.842-2.035	.232
Marital Stauts[a]	.023	.425	1.023	.445-2.352	.958	.084	.447	1.088	.453-2.612	.850	-.337	.491	.714	.273-1.871	.493	-.453	.533	.636	.223-1.809	.396
Number of Children	-.145	.126	.865	.676-1.107	.250	-.167	.148	.846	.632-1.131	.259	-.157	.158	.854	.627-1.165	.320	-.118	.166	.889	.642-1.232	.480
Living Arrangement [a]	2.878	.546	17.770	6.100-51.768	**<.001*** **	2.442	.614	11.496	3.452-38.280	**<.001*** **	1.995	.660	7.349	2.017-26.785	**.003****	2.394	.779	10.962	2.380-50.486	**.002****
Houshold Exp.						.049	.211	1.051	.695-1.588	.815	-.175	.238	.840	.527-1.339	.463	-.071	.257	.932	.563-1.542	.783
Handicapped ID [a]						1.192	.484	3.294	1.275-8.514	**.014***	.122	.581	1.130	.362-3.529	.834	-.477	.675	.621	.165-2.333	.480
Social Support						-.017	.054	.983	.885-1.092	.753	-.015	.059	.985	.878-1.105	.797	-.029	.066	.971	.853-1.106	.658
ADL											-.030	.010	.971	.953-.990	**.002****	-.032	.012	.968	.946-.990	**.005****
Co-Morbidity											.220	.161	1.246	.909-1.708	.171	.214	.169	1.238	.890-1.723	.205
DI. Knowledge																.087	.162	1.091	.794-1.498	.592
SW. Knowledge																.338	.132	1.402	1.082-1.817	**.011***
Attitudes																.105	.137	1.111	.849-1.453	.444
Social Norms[a]																1.859	.776	6.418	1.403-29.361	**.017***
Selective Control																.055	.058	1.056	.943-1.183	.344
	R^2_{CS}=.196, R^2_N=.288					R^2_{CS}=.222, R^2_N=.325					R^2_{CS}=.285, R^2_N=.418					R^2_{CS}=.345, R^2_N=.506				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 24. Logistic Regression of Variables Predicting the Utilization of Rehabilitation Services – Reduced Model II

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-3.124	2.112	.044		.139	-3.710	2.287	.024		.105	3.209	3.050	24.761		.293	-.348	3.542	.706		.922
Gender [a]	.706	.443	2.026	.851-4.824	.111	.893	.460	2.442	.992-6.012	.052	.743	.497	2.101	.794-5.564	.135	.590	.524	1.804	.646-5.042	.260
Age	.019	.028	1.019	.964-1.077	.509	.018	.029	1.019	.963-1.078	.523	-.039	.037	.962	.895-1.034	.291	-.057	.041	.945	.872-1.024	.166
Education Level	.072	.155	1.075	.793-1.456	.641	.138	.167	1.148	.828-1.593	.408	.306	.194	1.358	.929-1.987	.114	.229	.233	1.257	.796-1.985	.326
Marital Stauts[a]	.092	.428	1.096	.474-2.535	.830	.162	.450	1.176	.487-2.839	.719	-.264	.496	.768	.291-2.028	.594	-.460	.539	.631	.220-1.815	.393
Number of Children	-.150	.127	.861	.671-1.104	.238	-.181	.149	.835	.623-1.118	.225	-.169	.160	.844	.618-1.154	.289	-.162	.179	.850	.599-1.208	.365
Living Arrangement [a]	2.881	.546	17.824	6.109-52.009	**<.001*** **	2.439	.616	11.457	3.425-38.329	**<.001*** **	2.008	.666	7.445	2.020-27.442	**.003****	2.662	.784	14.325	3.078-66.659	**.001****
Houshold Exp.						.050	.211	1.051	.695-1.591	.812	-.183	.240	.833	.520-1.335	.448	.001	.265	1.001	.595-1.684	.997
Handicapped ID [a]						1.053	.498	2.866	1.081-7.603	.034	-.093	.605	.911	.279-2.981	.878	-.946	.731	.388	.093-1.627	.196
Social Support						-.002	.055	.998	.896-1.112	.977	.002	.061	1.002	.889-1.129	.972	-.013	.068	.987	.864-1.128	.851
ADL											-.032	.010	.969	.950-.988	**.001****	-.031	.011	.969	.948-.991	**.006****
Co-Morbidity											.196	.162	1.216	.885-1.672	.227	.165	.169	1.180	.848-1.642	.327
DI. Knowledge																.074	.163	1.077	.782-1.482	.651
SW. Knowledge																.414	.140	1.513	1.151-1.989	**.003****
Attitudes																.111	.135	1.118	.858-1.456	.409
Social Norms[a]																1.717	.774	5.570	1.222-25.396	**.027***
Compensatory Control																-.010	.061	.990	.877-1.116	.866
	R^2_{CS}=.201, R^2_N=.295					R^2_{CS}=.219, R^2_N=.322					R^2_{CS}=.286, R^2_N=.420					R^2_{CS}=.349, R^2_N=.512				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 25. Logistic Regression of Variables Predicting the Utilization of Alternative Therapies – Reduced Model I

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-6.917	1.906	.001		<.001	-6.202	2.031	.002		.002	-1.695	2.495	.184		.497	-5.356	3.053	.005		.079
Gender [a]	.184	.380	1.202	.570-2.534	.628	.247	.401	1.280	.583-2.810	.539	.290	.430	1.337	.575-3.105	.500	.117	.450	1.125	.466-2.716	.794
Age	.085	.026	1.089	1.036-1.145	**.001****	.079	.027	1.082	1.027-1.140	**.003****	.032	.030	1.032	.973-1.095	.293	.021	.034	1.021	.956-1.091	.530
Education Level	-.208	.137	.812	.620-1.063	.129	-.298	.150	.743	.553-.997	**.047***	-.130	.163	.878	.638-1.209	.424	-.170	.198	.844	.572-1.244	.391
Marital Stauts[a]	.113	.375	1.120	.537-2.336	.763	.036	.402	1.037	.471-2.281	.928	-.372	.442	.690	.290-1.638	.400	-.624	.480	.536	.209-1.371	.193
Number of Children	.023	.110	1.024	.825-1.270	.832	-.087	.127	.917	.715-1.176	.495	-.061	.133	.941	.725-1.221	.646	-.095	.141	.909	.690-1.199	.500
Living Arrangement [a]	.337	.477	1.400	.550-3.565	.480	.554	.580	1.740	.558-5.419	.340	-.075	.646	.927	.261-3.288	.907	.124	.714	1.132	.279-4.588	.862
Houshold Exp.						.513	.192	1.670	1.146-2.433	**.008****	.357	.203	1.429	.960-2.129	.079	.450	.228	1.569	1.004-2.452	**.048***
Handicapped ID [a]						.501	.460	1.650	.669-4.068	.277	-.350	.572	.705	.230-2.163	.541	-.688	.613	.502	.151-1.669	.261
Social Support						-.086	.048	.918	.835-1.009	.076	-.088	.050	.915	.829-1.010	.079	-.124	.056	.883	.791-.987	**.028***
ADL											-.018	.009	.982	.965-.999	**.043***	-.015	.010	.985	.965-1.005	.138
Co-Morbidity											.350	.141	1.419	1.076-1.872	**.013***	.307	.145	1.360	1.023-1.808	**.035***
DI. Knowledge																.154	.144	1.166	.880-1.546	.284
SW. Knowledge																.175	.115	1.191	.950-1.494	.129
Attitudes																.181	.120	1.199	.948-1.517	.130
Social Norms[a]																1.399	.659	4.050	1.113-14.735	**.034***
Selective Control																.013	.051	1.014	.918-1.120	.792
	R^2_{CS}=.107, R^2_N=.151					R^2_{CS}=.153, R^2_N=.215					R^2_{CS}=.225, R^2_N=.317					R^2_{CS}=.282, R^2_N=.397				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 26. Logistic Regression of Variables Predicting the Utilization of Alternative Therapies – Reduced Model II

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-6.923	1.935	.001		<.001	-6.275	2.057	.002		.002	-1.338	2.571	.262		.603	-4.980	3.150	.007		.114
Gender [a]	.290	.387	1.336	.626-2.852	.453	.340	.409	1.405	.630-3.130	.406	.428	.440	1.534	.647-3.638	.331	.261	.464	1.299	.523-3.226	.574
Age	.086	.026	1.090	1.036-1.147	**.001****	.080	.027	1.083	1.027-1.142	**.003****	.029	.031	1.029	.969-1.094	.352	.014	.036	1.014	.945-1.087	.701
Education Level	-.236	.140	.790	.600-1.039	.092	-.321	.153	.725	.537-.979	**.036***	-.128	.168	.880	.633-1.222	.445	-.219	.207	.804	.536-1.206	.291
Marital Stauts[a]	.104	.379	1.110	.528-2.334	.783	.025	.409	1.025	.460-2.285	.951	-.456	.455	.634	.260-1.545	.316	-.666	.498	.514	.194-1.362	.180
Number of Children	.000	.111	1.000	.804-1.244	.997	-.111	.128	.895	.696-1.151	.387	-.079	.136	.924	.708-1.205	.558	-.088	.152	.916	.680-1.233	.563
Living Arrangement [a]	.365	.481	1.441	.562-3.696	.447	.594	.583	1.811	.577-5.679	.309	-.013	.648	.987	.277-3.511	.984	.120	.689	1.128	.292-4.356	.861
Houshold Exp.						.505	.192	1.656	1.137-2.414	**.009****	.337	.205	1.401	.937-2.095	.100	.415	.232	1.514	.961-2.386	.074
Handicapped ID [a]						.427	.473	1.532	.606-3.873	.367	-.477	.597	.621	.193-1.999	.424	-.833	.646	.435	.123-1.542	.197
Social Support						-.079	.050	.924	.839-1.018	.111	-.089	.052	.915	.826-1.014	.089	-.116	.059	.891	.794-.999	**.049***
ADL											-.020	.009	.981	.963-.998	**.032***	-.019	.010	.981	.962-1.002	.072
Co-Morbidity											.370	.144	1.448	1.091-1.922	**.010***	.331	.148	1.392	1.041-1.862	**.026***
DI. Knowledge																.129	.145	1.137	.856-1.512	.376
SW. Knowledge																.202	.119	1.224	.970-1.545	.088
Attitudes																.206	.123	1.229	.966-1.563	.093
Social Norms[a]																1.331	.658	3.783	1.041-13.746	**.043***
Compensatory Control																.038	.054	1.039	.934-1.155	.484
	R^2_{CS}=.112, R^2_N=.158					R^2_{CS}=.153, R^2_N=.217					R^2_{CS}=.232, R^2_N=.328					R^2_{CS}=.293, R^2_N=.414				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 27. Logistic Regression of Variables Predicting the Utilization of Supportive Devices – Reduced Model I

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-12.528	2.193	<.001		<.001	-14.626	2.598	<.001		<.001	-7.431	3.078	.001		.016	-12.144	3.999	<.001		.002
Gender [a]	.843	.408	2.323	1.044-5.166	**.039***	1.008	.429	2.741	1.182-6.357	**.019***	.950	.498	2.585	.974-6.858	.056	.861	.589	2.366	.746-7.508	.144
Age	.155	.029	1.168	1.103-1.236	**<.001*****	.162	.031	1.175	1.106-1.248	**<.001*****	.122	.036	1.129	1.053-1.211	**.001****	.168	.044	1.183	1.084-1.290	**<.001*****
Education Level	-.023	.156	.977	.720-1.327	.884	.044	.170	1.045	.749-1.460	.794	.228	.200	1.256	.849-1.857	.254	.288	.257	1.334	.806-2.208	.262
Marital Stauts [a]	1.300	.405	3.670	1.659-8.122	**.001****	1.644	.458	5.174	2.108-12.701	**<.001*****	.786	.536	2.194	.767-6.279	.143	.112	.650	1.118	.313-3.996	.863
Number of Children	.078	.130	1.081	.837-1.396	.550	.016	.152	1.016	.755-1.368	.915	-.052	.178	.949	.670-1.345	.769	.035	.207	1.035	.690-1.554	.867
Living Arrangement [a]	.950	.593	2.586	.809-8.270	.109	.231	.671	1.259	.338-4.687	.731	-1.314	.865	.269	.049-1.464	.129	-.919	.891	.399	.070-2.287	.302
Houshold Exp.						.207	.207	1.230	.820-1.843	.317	.055	.256	1.056	.639-1.746	.831	.214	.286	1.239	.707-2.171	.454
Handicapped ID [a]						1.645	.544	5.182	1.784-15.047	**.002****	.205	.757	1.227	.279-5.409	.787	-.783	.849	.457	.087-2.413	.356
Social Support						.017	.049	1.017	.923-1.120	.738	.018	.055	1.018	.914-1.134	.747	-.017	.067	.983	.862-1.120	.794
ADL											-.053	.015	.949	.922-.977	**<.001*****	-.038	.016	.963	.933-.994	**.018***
Co-Morbidity											.523	.181	1.686	1.183-2.403	**.004****	.552	.208	1.737	1.154-2.613	**.008****
DI. Knowledge																-.192	.179	.825	.582-1.171	.283
SW. Knowledge																.565	.171	1.760	1.257-2.462	**.001****
Attitudes																.192	.152	1.212	.899-1.632	.207
Social Norms [a]																.907	.699	2.478	.629-9.756	.194
Selective Control																-.221	.082	.802	.682-.942	**.007****
	R^2_{CS}=.136, R^2_N=.250					R^2_{CS}=.174, R^2_N=.300					R^2_{CS}=.294, R^2_N=.461					R^2_{CS}=.348, R^2_N=.534				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 28. Logistic Regression of Variables Predicting the Utilization of Supportive Devices – Reduced Model II

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-12.363	2.209	<.001		<.001	-14.739	2.639	<.001		<.001	-7.018	3.148	.001		.026	-11.756	3.976	<.001		.003
Gender [a]	.763	.412	2.145	.957-4.805	.064	.899	.434	2.457	1.049-5.756	**.038***	.844	.505	2.326	.865-6.256	.094	.806	.577	2.239	.722-6.940	.163
Age	.153	.029	1.165	1.100-1.234	**<.001*****	.160	.031	1.174	1.104-1.247	**<.001*****	.117	.036	1.124	1.047-1.206	**.001****	.147	.042	1.159	1.066-1.259	**.001****
Education Level	-.042	.157	.959	.705-1.306	.792	.019	.173	1.019	.726-1.431	.912	.224	.206	1.251	.835-1.874	.278	.208	.259	1.231	.741-2.045	.422
Marital Stauts[a]	1.406	.414	4.079	1.814-9.174	**.001****	1.794	.476	6.014	2.366-15.286	**<.001*****	.848	.559	2.335	.781-6.982	.129	.352	.650	1.422	.398-5.086	.588
Number of Children	.099	.132	1.104	.852-1.430	.454	.022	.153	1.022	.757-1.381	.886	-.030	.180	.970	.682-1.380	.867	-.030	.205	.970	.649-1.450	.883
Living Arrangement [a]	.904	.595	2.469	.770-7.920	.129	.179	.674	1.196	.319-4.482	.790	-1.299	.862	.273	.050-1.478	.132	-1.058	.899	.347	.060-2.022	.239
Houshold Exp.						.230	.208	1.258	.836-1.893	.270	.066	.258	1.068	.645-1.770	.798	.215	.278	1.240	.719-2.140	.439
Handicapped ID [a]						1.582	.551	4.864	1.651-14.329	**.004****	.138	.767	1.148	.256-5.157	.857	-.682	.859	.506	.094-2.725	.427
Social Support						.028	.050	1.028	.932-1.135	.580	.019	.057	1.019	.912-1.139	.738	-.011	.066	.989	.868-1.126	.863
ADL											-.054	.015	.948	.920-.976	**<.001*****	-.039	.016	.962	.932-.993	**.016***
Co-Morbidity											.496	.181	1.642	1.150-2.343	**.006****	.572	.210	1.772	1.174-2.674	**.006****
DI. Knowledge																-.174	.172	.841	.600-1.177	.313
SW. Knowledge																.486	.161	1.625	1.186-2.227	**.003****
Attitudes																.256	.146	1.292	.970-1.722	.080
Social Norms[a]																1.083	.695	2.954	.756-11.541	.119
Compensatory Control																-.155	.076	.856	.738-.993	**.041***
	R^2_{CS}=.141, R^2_N=.256					R^2_{CS}=.177, R^2_N=.305					R^2_{CS}=.294, R^2_N=.461					R^2_{CS}=.338, R^2_N=.521				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 29. Logistic Regression of Variables Predicting the Utilization of Supplemental Health Food – Reduced Model I

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-7.830	1.834	<.001		<.001	-8.092	1.992	<.001		<.001	-6.775	2.368	.001		.004	-11.437	2.957	<.001		<.001
Gender [a]	1.065	.367	2.902	1.413-5.959	**.004****	1.022	.382	2.778	1.315-5.869	**.007****	1.143	.403	3.135	1.424-6.905	**.005****	1.098	.429	2.999	1.294-6.951	**.010***
Age	.106	.025	1.112	1.058-1.167	**<.001*****	.099	.026	1.105	1.051-1.161	**<.001*****	.074	.027	1.077	1.020-1.136	**.007****	.068	.031	1.070	1.007-1.137	**.029***
Education Level	-.074	.129	.928	.720-1.196	.566	-.174	.139	.840	.640-1.103	.209	-.091	.145	.913	.687-1.213	.530	-.186	.186	.830	.576-1.195	.317
Marital Stauts[a]	-.284	.358	.753	.373-1.520	.428	-.261	.386	.770	.361-1.641	.498	-.531	.412	.588	.262-1.318	.197	-.842	.464	.431	.174-1.070	.070
Number of Children	-.189	.109	.828	.669-1.026	.084	-.313	.126	.731	.571-.936	**.013***	-.317	.129	.728	.565-.938	**.014***	-.361	.138	.697	.531-.913	**.009****
Living Arrangement [a]	.426	.477	1.531	.601-3.899	.372	.709	.568	2.032	.667-6.189	.212	.512	.600	1.668	.515-5.402	.394	.267	.657	1.306	.360-4.735	.685
Houshold Exp.						.368	.176	1.444	1.022-2.041	**.037***	.295	.183	1.344	.939-1.922	.106	.300	.201	1.349	.909-2.003	.137
Handicapped ID [a]						-.331	.452	.718	.296-1.743	.465	-.688	.541	.502	.174-1.450	.203	-.896	.591	.408	.128-1.300	.130
Social Support						.003	.046	1.003	.917-1.097	.949	.011	.047	1.011	.922-1.108	.814	.009	.050	1.009	.914-1.113	.864
ADL											.000	.008	.999	.983-1.015	.908	.000	.010	.999	.980-1.018	.940
Co-Morbidity											.309	.129	1.362	1.057-1.753	**.017***	.282	.140	1.326	1.008-1.743	**.043***
DI. Knowledge																.192	.132	1.212	.936-1.570	.146
SW. Knowledge																.137	.111	1.146	.922-1.426	.219
Attitudes																.275	.108	1.316	1.064-1.628	**.011***
Social Norms[a]																.573	.537	1.773	.619-5.078	.286
Selective Control																.040	.046	1.041	.951-1.139	.383
	R^2_{CS}=.145, R^2_N=.194					R^2_{CS}=.170, R^2_N=.228					R^2_{CS}=.200, R^2_N=.269					R^2_{CS}=.287, R^2_N=.384				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 30. Logistic Regression of Variables Predicting the Utilization of Supplemental Health Food – Reduced Model II

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-7.898	1.844	<.001		<.001	-8.056	1.990	<.001		<.001	-6.749	2.398	.001		.005	-11.233	2.988	<.001		<.001
Gender [a]	1.019	.369	2.771	1.343-5.716	**.006****	.978	.385	2.660	1.251-5.655	**.011***	1.121	.407	3.069	1.382-6.816	**.006****	1.088	.436	2.967	1.263-6.971	**.013***
Age	.106	.025	1.112	1.058-1.168	**.000*****	.099	.026	1.104	1.050-1.161	**<.001*****	.074	.028	1.077	1.020-1.137	**.008****	.064	.031	1.066	1.002-1.134	**.042***
Education Level	-.059	.130	.943	.730-1.218	.653	-.159	.140	.853	.648-1.123	.257	-.067	.148	.935	.700-1.248	.648	-.169	.188	.844	.584-1.221	.369
Marital Stauts[a]	-.286	.361	.751	.370-1.524	.428	-.256	.391	.774	.360-1.666	.513	-.555	.419	.574	.252-1.306	.186	-.804	.470	.448	.178-1.125	.087
Number of Children	-.179	.109	.836	.675-1.037	.103	-.301	.126	.740	.578-.948	**.017***	-.304	.129	.738	.573-.951	**.019***	-.308	.143	.735	.555-.973	**.031***
Living Arrangement [a]	.408	.478	1.504	.589-3.838	.393	.669	.568	1.952	.641-5.944	.239	.482	.599	1.619	.501-5.231	.421	.289	.642	1.335	.379-4.698	.653
Houshold Exp.						.370	.176	1.448	1.025-2.045	**.036***	.299	.182	1.348	.943-1.927	.102	.280	.202	1.323	.891-1.966	.166
Handicapped ID [a]						-.263	.459	.769	.312-1.892	.567	-.585	.549	.557	.190-1.635	.287	-.726	.610	.484	.147-1.598	.234
Social Support						-.002	.046	.998	.911-1.093	.965	.003	.047	1.003	.914-1.100	.956	.003	.051	1.003	.908-1.108	.956
ADL											.000	.008	.999	.983-1.016	.942	-.001	.010	.999	.980-1.018	.907
Co-Morbidity											.314	.130	1.369	1.061-1.767	**.016***	.268	.138	1.307	.998-1.712	.052
DI. Knowledge																.207	.133	1.230	.948-1.596	.118
SW. Knowledge																.121	.111	1.128	.907-1.404	.279
Attitudes																.241	.109	1.273	1.029-1.575	**.026***
Social Norms[a]																.537	.533	1.710	.602-4.857	.314
Compensatory Control																.064	.048	1.066	.971-1.171	.179
	R^2_{CS}=.101, R^2_N=.192					R^2_{CS}=.166, R^2_N=.223					R^2_{CS}=.197, R^2_N=.264					R^2_{CS}=.286, R^2_N=.383				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 31. Logistic Regression of Variables Predicting the Utilization of Family Care – Reduced Model I

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-8.873	1.965	<.001		<.001	-12.154	2.365	<.001		<.001	-4.411	2.840	.012		.120	-6.403	3.375	.002		.058
Gender [a]	.762	.382	2.142	1.014-4.525	**.046***	.925	.418	2.522	1.111-5.727	**.027***	.766	.488	2.152	.827-5.600	.116	.602	.510	1.826	.672-4.964	.238
Age	.113	.027	1.120	1.063-1.180	**<.001*****	.110	.028	1.117	1.057-1.179	**<.001*****	.079	.034	1.082	1.012-1.156	**.020***	.073	.037	1.076	1.000-1.158	**.049***
Education Level	-.272	.142	.762	.577-1.006	.055	-.242	.157	.785	.577-1.067	.122	-.072	.185	.931	.648-1.337	.699	-.035	.224	.965	.623-1.496	.874
Marital Stauts[a]	.172	.378	1.188	.566-2.491	.649	.672	.421	1.957	.858-4.466	.111	-.035	.520	.966	.349-2.675	.946	-.234	.557	.792	.266-2.357	.675
Number of Children	.134	.121	1.144	.903-1.449	.265	.018	.143	1.018	.770-1.348	.899	.090	.167	1.094	.789-1.519	.589	.101	.177	1.107	.782-1.566	.567
Living Arrangement [a]	1.627	.574	5.087	1.651-15.671	**.005****	.633	.674	1.883	.503-7.049	.347	-.444	.844	.642	.123-3.356	.599	-.258	.872	.773	.140-4.272	.768
Houshold Exp.						.212	.193	1.236	.846-1.804	.273	.022	.240	1.022	.639-1.636	.926	.103	.255	1.109	.673-1.826	.684
Handicapped ID [a]						1.714	.511	5.551	2.037-15.123	**.001****	.351	.661	1.421	.389-5.189	.595	-.125	.680	.883	.233-3.348	.855
Social Support						.115	.052	1.121	1.013-1.241	**.027***	.135	.062	1.144	1.014-1.292	**.029***	.121	.065	1.129	.993-1.283	.063
ADL											-.065	.014	.937	.912-.963	**<.001*****	-.055	.014	.947	.921-.973	**<.001*****
Co-Morbidity											.055	.164	1.056	.766-1.455	.739	.023	.176	1.023	.724-1.446	.896
DI. Knowledge																-.004	.168	.996	.716-1.386	.982
SW. Knowledge																.227	.142	1.255	.950-1.658	.110
Attitudes																.038	.135	1.039	.797-1.354	.776
Social Norms[a]																1.278	.707	3.591	.898-14.362	.071
Selective Control																-.050	.059	.951	.848-1.067	.393
	R^2_{CS}=111., R^2_N=.199					R^2_{CS}=.188, R^2_N=.301					R^2_{CS}=.317, R^2_N=.373					R^2_{CS}=.335, R^2_N=.497				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 32. Logistic Regression of Variables Predicting the Utilization of Family Care – Reduced Model II

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-8.663	1.973	<.001		<.001	-11.917	2.363	<.001		<.001	-3.421	2.925	.033		.242	-5.777	3.474	.003		.096
Gender [a]	.813	.386	2.254	1.058-4.799	**.035***	.962	.423	2.616	1.142-5.994	**.023***	.845	.503	2.328	.868-6.243	.093	.705	.527	2.024	.721-5.687	.181
Age	.110	.027	1.116	1.059-1.176	**<.001*****	.107	.028	1.113	1.053-1.176	**<.001*****	.068	.035	1.070	1.000-1.145	.051	.067	.039	1.069	.991-1.153	.084
Education Level	-.273	.143	.761	.575-1.007	.056	-.247	.158	.781	.573-1.065	.119	-.033	.194	.968	.662-1.415	.866	-.042	.235	.959	.605-1.521	.860
Marital Stauts[a]	.148	.381	1.159	.550-2.446	.698	.637	.425	1.890	.822-4.350	.134	-.194	.547	.823	.282-2.407	.723	-.372	.583	.689	.220-2.163	.524
Number of Children	.130	.121	1.139	.899-1.444	.281	.015	.143	1.015	.767-1.343	.917	.109	.170	1.115	.799-1.557	.521	.091	.183	1.095	.766-1.566	.619
Living Arrangement [a]	1.673	.573	5.327	1.732-16.387	**.004****	.689	.670	1.992	.536-7.400	.303	-.350	.839	.705	.136-3.647	.676	-.237	.874	.789	.142-4.375	.786
Houshold Exp.						.199	.192	1.220	.837-1.779	.300	-.026	.244	.975	.604-1.572	.917	.075	.261	1.078	.647-1.797	.773
Handicapped ID [a]						1.624	.518	5.073	1.837-14.005	**.002****	.102	.690	1.107	.286-4.284	.883	-.403	.709	.668	.166-2.684	.570
Social Support						.117	.053	1.124	1.013-1.248	**.028***	.138	.066	1.148	1.010-1.306	**.035***	.129	.070	1.138	.992-1.305	.066
ADL											-.069	.014	.934	.908-.960	**<.001*****	-.058	.014	.943	.917-.970	**<.001*****
Co-Morbidity											.070	.167	1.073	.773-1.488	.674	.062	.176	1.063	.753-1.503	.727
DI. Knowledge																-.033	.171	.967	.692-1.352	.846
SW. Knowledge																.255	.145	1.291	.972-1.714	.077
Attitudes																.065	.139	1.067	.813-1.401	.640
Social Norms[a]																1.284	.717	3.612	.887-14.714	.073
Compensatory Control																-.054	.062	.948	.839-1.070	.386
	R^2_{CS}=.110, R^2_N=.198					R^2_{CS}=.185, R^2_N=.297					R^2_{CS}=.324, R^2_N=.484					R^2_{CS}=.343, R^2_N=.509				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 33. Logistic Regression of Variables Predicting the Utilization of Foreign Domestic Workers – Reduced Model I

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-15.625	3.044	<.001		<.001	-20.426	3.931	<.001		<.001	-14.403	4.512	<.001		.001	-13.258	5.424	<.001		.015
Gender [a]	-.015	.498	.985	.371-2.612	.975	-.365	.596	.694	.216-2.234	.540	-.697	.666	.498	.135-1.837	.295	-.599	.726	.550	.132-2.280	.410
Age	.181	.039	1.198	1.110-1.293	**<.001*** **	.178	.044	1.194	1.096-1.301	**<.001*** **	.138	.051	1.148	1.039-1.268	**.007** **	.104	.059	1.110	.989-1.246	.077
Education Level	-.150	.173	.861	.613-1.209	.387	-.374	.204	.688	.461-1.026	.066	-.103	.239	.902	.565-1.441	.667	.526	.349	1.691	.854-3.352	.132
Marital Stauts[a]	.997	.494	2.710	1.030-7.132	**.043***	1.906	.633	6.727	1.946-23.257	**.003** **	1.903	.724	6.706	1.622-27.715	**.009** **	1.736	.804	5.674	1.174-27.431	**.031***
Number of Children	.163	.143	1.177	.889-1.558	.255	-.165	.180	.848	.596-1.206	.359	-.124	.196	.884	.601-1.298	.528	-.255	.228	.775	.496-1.211	.263
Living Arrangement [a]	-3.236	1.102	.039	.005-.341	**.003** **	-5.713	1.667	.003	.000-.087	**.001** **	-8.358	2.170	.000	.000-.016	**<.001*** **	-8.996	2.502	<.001	.000-.017	**<.001*** **
Houshold Exp.						1.163	.297	3.199	1.785-5.730	**<.001*** **	.962	.337	2.617	1.351-5.070	**.004** **	.921	.423	2.512	1.097-5.752	**.029***
Handicapped ID [a]						2.055	.805	7.803	1.611-37.790	**.011***	1.154	1.002	3.171	.445-22.613	.250	1.568	1.084	4.798	.573-40.194	.148
Social Support						.065	.073	1.067	.926-1.231	.370	.088	.081	1.091	.930-1.280	.283	.078	.088	1.081	.909-1.285	.381
ADL											-.048	.014	.953	.927-.980	**.001** **	-.043	.017	.958	.926-.990	**.011***
Co-Morbidity											.122	.200	1.130	.763-1.674	.542	.007	.234	1.007	.637-1.592	.977
DI. Knowledge																-.363	.296	.696	.390-1.242	.220
SW. Knowledge																-.372	.230	.689	.439-1.083	.106
Attitudes																.561	.240	1.752	1.096-2.801	**.019***
Social Norms[a]																1.715	1.420	5.556	.344-89.816	.227
Selective Control																-.102	.083	.903	.768-1.062	.218
	R^2_{CS}=.277, R^2_N=.424					R^2_{CS}=.389, R^2_N=.595					R^2_{CS}=.466, R^2_N=.684					R^2_{CS}=.485, R^2_N=.742				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 34. Logistic Regression of Variables Predicting the Utilization of Foreign Domestic Workers – Reduced Model II

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-16.323	3.145	<.001		<.001	-21.888	4.235	<.001		<.001	-15.215	4.759	<.001		.001	-16.731	6.150	<.001		.007
Gender [a]	.129	.509	1.138	.419-3.088	.800	-.233	.615	.792	.237-2.646	.705	-.472	.685	.624	.163-2.389	.491	-.283	.772	.754	.166-3.422	.714
Age	.192	.040	1.211	1.119-1.311	**<.001*** **	.198	.047	1.219	1.111-1.338	**<.001*** **	.150	.053	1.162	1.047-1.290	**.005** **	.152	.067	1.165	1.022-1.327	**.022***
Education Level	-.164	.177	.849	.600-1.201	.355	-.394	.211	.675	.446-1.020	.062	-.091	.250	.913	.559-1.489	.715	.636	.380	1.888	.897-3.976	.094
Marital Stauts [a]	.929	.498	2.532	.954-6.718	.062	1.920	.654	6.824	1.894-24.584	**.003** **	1.730	.742	5.641	1.318-24.134	**.020***	1.646	.849	5.186	.981-27.403	.053
Number of Children	.125	.145	1.133	.852-1.506	.390	-.210	.184	.811	.565-1.163	.255	-.138	.199	.871	.589-1.287	.488	-.471	.271	.624	.367-1.062	.082
Living Arrangement [a]	-3.297	1.112	.037	.004-.327	**.003** **	-6.175	1.777	.002	.000-.068	**.001** **	-8.440	2.211	.000	.000-.016	**<.001*** **	-10.015	2.672	.000	.000-.008	**.000*** **
Houshold Exp.						1.169	.301	3.218	1.782-5.809	**<.001*** **	.935	.337	2.548	1.315-4.936	**.006** **	1.127	.475	3.086	1.216-7.837	**.018***
Handicapped ID [a]						2.373	.876	10.729	1.928-59.693	**.007** **	1.452	1.062	4.273	.533-34.264	.171	2.316	1.294	10.139	.803-127.979	.073
Social Support						.065	.075	1.067	.921-1.235	.387	.072	.083	1.074	.913-1.264	.386	.024	.094	1.025	.852-1.232	.795
ADL											-.045	.014	.956	.929-.983	**.001** **	-.037	.018	.964	.930-.998	**.037***
Co-Morbidity											.161	.202	1.175	.791-1.746	.425	.109	.233	1.115	.706-1.761	.641
DI. Knowledge																-.485	.330	.616	.323-1.175	.141
SW. Knowledge																-.444	.251	.641	.392-1.049	.077
Attitudes																.764	.291	2.148	1.215-3.797	**.009** **
Social Norms [a]																2.162	1.443	8.687	.513-147.018	.134
Compensatory Control																-.202	.108	.817	.661-1.011	.063
	R^2_{CS}=.283, R^2_N=.434					R^2_{CS}=.397, R^2_N=.610					R^2_{CS}=.449, R^2_N=.689					R^2_{CS}=.2499, R^2_N=.766				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 35. Logistic Regression of Variables Predicting the Utilization of Social Care Services – Reduced Model I

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-3.581	3.539	.028		.312	-4.369	3.925	.013		.266	-6.688	4.891	.001		.171	-13.249	8.617	<.001		.124
Gender [a]	.132	.659	1.141	.314-4.149	.841	.968	.817	2.632	.531-13.043	.236	1.586	.923	4.885	.801-29.800	.086	1.689	1.188	5.413	.528-55.501	.155
Age	.014	.048	1.014	.923-1.114	.765	.040	.049	1.041	.946-1.146	.412	.015	.059	1.015	.903-1.140	.807	.105	.097	1.111	.918-1.345	.280
Education Level	.066	.230	1.068	.680-1.678	.774	.291	.268	1.337	.791-2.262	.278	.397	.292	1.487	.838-2.637	.175	-.429	.535	.651	.228-1.859	.423
Marital Stauts[a]	2.153	.850	8.615	1.629-4.554	**.011***	2.272	1.011	9.699	1.337-7.037	**.025***	2.178	1.032	8.826	1.169-16.654	**.035***	3.566	1.532	35.387	1.757-17.832	**.020***
Number of Children	-.587	.229	.556	.355-.872	**.011***	-.299	.250	.741	.454-1.210	.231	-.449	.291	.638	.361-1.129	.123	-.562	.455	.570	.234-1.390	.216
Living Arrangement [a]	-1.404	1.136	.246	.026-2.278	.217	-1.855	1.373	.156	.011-2.309	.177	-2.026	1.603	.132	.006-3.050	.206	1.038	1.699	2.825	.101-78.914	.541
Houshold Exp.						-.551	.396	.577	.265-1.254	.165	-.595	.427	.551	.239-1.273	.163	-.244	.608	.783	.238-2.582	.688
Handicapped ID [a]						1.871	.990	6.497	.933-45.263	.059	2.432	1.146	11.387	1.205-107.628	**.034***	1.422	1.630	4.145	.170-101.075	.383
Social Support						-.089	.073	.915	.793-1.056	.223	-.070	.078	.933	.801-1.086	.369	-.222	.113	.801	.642-.999	**.049***
ADL											.032	.020	1.032	.992-1.074	.121	.072	.036	1.075	1.002-1.153	**.043***
Co-Morbidity											.486	.325	1.626	.861-3.074	.134	.887	.437	2.428	1.032-5.716	**.042***
DI. Knowledge																.300	.341	1.350	.692-2.633	.379
SW. Knowledge																1.116	.403	3.053	1.385-6.728	**.006****
Attitudes																-1.023	.400	.360	.164-.788	**.011***
Social Norms[a]																-.694	1.296	.500	.039-6.336	.592
Selective Control																-.129	.097	.879	.727-1.063	.184
	R^2_{CS}=.102, R^2_N=.161					R^2_{CS}=140, R^2_N=.209					R^2_{CS}=.187, R^2_N=.250					R^2_{CS}=.272, R^2_N=.455				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 36. Logistic Regression of Variables Predicting the Utilization of Social Care Services – Reduced Model II

Variable	*Model 1*					*Model 2*					*Model 3*					*Model 4*				
	B	S.E.	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value	B	SE	OR	95%CI	p-value
Constant	-3.679	3.531	.025		.297	-4.534	3.911	.011		.246	-7.294	4.999	.001		.145	-14.343	8.365	<.001		.086
Gender [a]	.138	.660	1.147	.315-4.184	.835	.963	.811	2.618	.534-12.828	.235	1.599	.908	4.948	.834-29.354	.078	1.897	1.175	6.667	.666-66.751	.107
Age	.016	.048	1.017	.925-1.117	.732	.043	.049	1.044	.948-1.150	.383	.021	.060	1.021	.907-1.149	.731	.102	.091	1.108	.927-1.323	.259
Education Level	.053	.231	1.054	.670-1.659	.820	.296	.272	1.345	.789-2.292	.277	.416	.305	1.516	.834-2.755	.172	-.367	.532	.693	.244-1.964	.490
Marital Stauts[a]	2.159	.848	8.665	1.644-45.660	**.011***	2.225	1.004	9.253	1.294-66.180	**.027***	2.081	1.022	8.016	1.082-59.411	**.042***	3.439	1.542	31.155	1.517-639.661	**.026***
Number of Children	-.586	.229	.556	.355-.871	**.010***	-.301	.250	.740	.454-1.208	.228	-.457	.291	.633	.358-1.121	.117	-.593	.434	.552	.236-1.294	.172
Living Arrangement [a]	-1.436	1.138	.238	.026-2.214	.207	-1.877	1.373	.153	.010-2.256	.172	-2.041	1.604	.130	.006-3.012	.203	.589	1.671	1.803	.068-47.691	.724
Houshold Exp.						-.539	.393	.583	.270-1.259	.169	-.577	.420	.562	.247-1.278	.169	-.182	.600	.834	.257-2.703	.762
Handicapped ID [a]						1.902	.989	6.696	.964-46.500	.054	2.576	1.162	13.146	1.349-128.133	**.027***	1.720	1.702	5.585	.199-157.069	.312
Social Support						-.090	.074	.913	.791-1.055	.220	-.074	.079	.929	.796-1.083	.346	-.200	.108	.818	.662-1.011	.064
ADL											.034	.021	1.034	.993-1.077	.105	.066	.035	1.068	.998-1.143	.057
Co-Morbidity											.498	.327	1.646	.867-3.124	.128	.847	.412	2.334	1.041-5.229	**.040***
DI. Knowledge																.288	.333	1.333	.695-2.559	.387
SW. Knowledge																.956	.375	2.601	1.247-5.424	**.011***
Attitudes																-.901	.360	.406	.201-.823	**.012***
Social Norms[a]																-.129	1.212	.879	.082-9.444	.915
Compensatory Control																-.058	.106	.944	.766-1.162	.584
	R^2_{CS}=.101, R^2_N=.157					R^2_{CS}=.139, R^2_N=.210					R^2_{CS}=.190, R^2_N=.255					R^2_{CS}=.268, R^2_N=.439				

Note. (1) B=unstandardized Beta; S.E.=standard error for the coefficient; OR= Exp(B)=odds ratio; 95%CI=95% confidential index for Exp(B); R^2_{CS} =Cox and Snell R^2 ; R^2_N =Nagelkerke R^2; (2) [a] : reference; 'Gender', male participants were coded as reference; 'Marital Status', married participants as reference to widowed ones; 'Living Arrangement', community-dwelling participants as reference to institutionalized ones; 'Social Norms', participants who make health care appointments on their own as reference to participants letting others do the appointments; "Handicapped ID", ID-holder were coded as reference to persons without this ID; (3) Household Exp.= household expenditure; DI. Knowledge= disease-related knowledge; SW. Knowledge= social welfare related knowledge; (4)*p<0.05 **p<0.01 ***p<0.001

Table 37. Significant Predictor Addressing the Utilization of Each Health Care Service Examined

Variables	*OPD*	*ER*	*Hospitali-zation*	*REHA*	*CIPRS*	*Alternative Therapy*	*Supportive Device*	*Health Food*	*Family Care*	*Social Care*
Female		(−)*						(+)**		
Age	(−)**						(+)***	(+)*		
Education Level										
Marital Status(widowed ones)										(+)*
Number of Children	(+)*	(+)**						(−)*		
Living Arrangement[a]				(+)**						
Household Expenditure										
Handicapped ID[a]										
Social Support						(−)*				(−)*
ADL		(−)**	(−)***	(−)**			(−)*		(−)***	(+)*
Co-Morbidity						(+)*	(+)**	(+)*		(+)*
Disease-related Knowledge	(−)*				(+)*					
Social Welfare Related Knowledge				(+)*			(+)**			(+)**
Attitudes								(+)*		(−)*
Social Norms[a]		(+)*		(−)*		(−)*				
Selective Control							(−)**			
Compensatory Control										

Note: *p<.05, **p<.01, ***p<.001

Table 38. Zero-Order Correlations for the Initial Variables Used in the Path Analysis Testing the Utilization of Medical Services: An Example (I)

	1.	*2.*	*3.*	*4.*	*5.*	*6.*	*7.*	*8.*	*9.*	*10.*	*11.*	*12.*	*13.*	*14.*	*15.*	*16.*
1. Age	—	-.029	.290**	.269**	.133	-.356**	-.442**	.433**	.436**	.477**	.255**	-.238**	.255**	-.169*	-.042	.225**
2. Education Level		—	-.344**	.136	-.011	.284**	.339**	-.330**	-.307**	-.278**	-.113	.391**	-.151*	.497**	.468**	-.193**
3. Number of Children			—	.418**	.265**	-.216**	-.293**	.317**	.304**	.236**	.155*	-.299**	.229**	-.259**	-.321**	.235**
4. Houshold Expenditure				—	.357**	-.151*	-.212**	.167*	.210**	.141	.129	-.153*	.163*	.040	.074	.108
5. Social Support					—	-.199**	-.284**	.133	.149*	.088	.074	-.130	.064	-.076	-.065	.189*
6. ADL						—	**.844****	**-.776****	**-.856****	-.619**	-.292**	.127	-.283**	.561**	.476**	-.671**
7. IADL							—	**-.764****	**-.839****	-.611**	-.353**	.217**	-.364**	.632**	.490**	-.566**
8. Disease Duration								—	**.896****	.641**	.379**	-.093	.383**	-.627**	-.519**	.555**
9. Disease Severity									—	.669**	.395**	-.104	.369**	-.626**	-.487**	.569**
10. Co-Morbidity										—	.344**	-.216**	.315**	-.475**	-.322**	.479**
11. DI. Knowledge											—	.084	.581**	-.237**	-.130	.271**
12. SW. Knowledge												—	-.042	.263**	.229**	-.048
13. Attitudes													—	-.277**	-.119	.304**
14. Selective Control														—	**.847****	-.333**
15. Compensatory Control															—	-.335**
16. Utilizaton of Medical Services																—

Note. DI. Knowledge=disease related knowledge; SW. Knowledge=social welfare related knowledge ; *p<.05, **p<.01

Table 39 Zero-Order Correlations for the Final Variables Used in the Path Analysis Testing the Utilization of Medical Services: An Example (II)

	1.	*2.*	*3.*	*4.*	*5.*	*6.*	*7.*	*8.*	*9.*	*10.*	*11.*	*12.*	*13.*
1. Age	—	-.029	.290**	.269**	.133	-.356**	.477**	.255**	-.238**	.255**	-.169*	-.042	.225**
2. Education Level		—	-.344**	.136	-.011	.284**	-.278**	-.113	.391**	-.151*	.497**	.468**	-.193**
3. Number of Children			—	.418**	.265**	-.216**	.236**	.155*	-.299**	.229**	-.259**	-.321**	.235**
4. Household Expenditure				—	.357**	-.151*	.141	.129	-.153*	.163*	.040	.074	.108
5. Social support					—	-.199**	.088	.074	-.130	.064	-.076	-.065	.189*
6. ADL						—	-.619**	-.292**	.127	-.283**	.561**	.476**	-.671**
7. Co-Morbidity							—	.344**	-.216**	.315**	-.475**	-.322**	.479**
8. DI. Knowledge [a]								—	.084	.581**	-.237**	-.130	.271**
9. SW. Knowledge [a]									—	-.042	.263**	.229**	-.048
10. Attitudes [a]										—	-.277**	-.119	.304**
11. Selective Control											—	**.847****	-.333**
12. Compensatory Control												—	-.335**
13. Use of Medical Services													—

Note. [a]: DI. Knowledge=disease related knowledge; SW. Knowledge=social welfare related knowledge

Table 40. Variables Testing the Utilization of Medical Services

Unstandardized Coefficients, Path Coefficients and Significance reported

Variables	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
Predisposing Characteristics					
Age	.040***	.028**	.274***	.194**	-.079**
Education Level	-.105*	-.107	-.137*	-.141	-.004
Number of Children	.023	.047	.036	.074	.038
Enabling Resources					
Household Expenditure	-.002	-.003	-.035	-.071	-.036
Social Support	.019	.030	.072	.117	.045
Need Level					
ADL	.000	-.020***	.009	-.584***	-.593***
Co-Morbidity	.002	.078	.003	.131	.129
Psychological Characteristics					
Disease-related Knowledge	---	.007	---	.091	.091
Welfare related Knowledge	---	.022	---	.043	.043
Attitudes towards Health Care	---	.062*	---	.126*	.126*
Selective Control	---	.018	---	.092	.092
Compensatory Control	---	-.001	---	-.017	-.017

Model fit: χ^2=14.97, df=11, p=.184, NFI=.962, GFI=.983, RMSEA=.043

Note: *p<.05, **p<.01, ***p<.001

Table 41. Significant Paths Within the Model Testing the Utilization of Medical Services

Unstandardized Coefficients, Standardized Coefficients, Path Coefficients and Significance reported

Path	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
ADL → Utilization of Medical Services	**.000**	**-.020*****	**.009**	**-.584*****	**-.593*****
Attitudes → Utilization of Medical Services	**---**	**-.062***	**---**	**.126***	**.126***
Age → Utilization of Medical Services	**.040*****	**.028*****	**.274*****	**.194*****	**-.079****
Education Level → Utilization of Medical Services	-.105*	-.107	-.137*	-.141	-.004
Age → ADL	-.040	-1.447***	-.010	-.345***	-.335***
Age → Co-Morbidity	.000	.117***	.000	.478***	.479***
Age → Social Welfare related Knowledge	-.001	-.058**	-.002	-.203**	-.201**
Age → Attitudes	.026*	.061**	.087*	.205**	.118**
Age → Selective Control	-.126***	-.142**	-.169***	-.191**	-.022**
Education Level → ADL	.202	1.500***	.009	.244***	.235***
Education Level → Co-Morbidity	-.003	-.305***	-.003	-.237***	-.234***
Education Level → Social Welfare related Knowledge	-.015	.508***	-.010	.340***	.351***
Education Level → Selective Control	.440**	1.946*	.112**	.496*	.384*
Education Level → Compensatory Control	-.126	1.566*	-.012	.150*	.162*
Number of Children → Social Support	---	.569**	---	.234**	.234**
Number of Children → Welfare related Knowledge	-.015	-.167*	-.012	-.136*	-.123*
ADL → Selective Control	---	.057***	---	.318***	.318***

Note: *p<.05, **p<.01, ***p<.001

Table 42. Variables Testing the Utilization of CAM

Unstandardized Coefficients, Path Coefficients and Significance reported

Variables	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
Predisposing Characteristics					
Age	.112*	-.058	.117	-.060*	-.177
Education Level	-.339	.221	-.067	.044	.111
Number of Children	-.093	.274	-.022	.066	.088
Enabling Resources					
Household Expenditure	-.003	-.010	-.010	-.035	-.025
Social Support	-.018	-.051	-.010	-.030	-.019
Need Level					
ADL	-.004	.007	-.017	.030	.047
Co-Morbidity	-.032	1.197**	-.008	.306**	.314**
Psychological Characteristics					
Disease-related Knowledge	---	-.006	---	-.011	-.011
Welfare related Knowledge	---	.219	---	.065	.065
Attitudes towards Health Care	---	-.260	---	-.080	-.080
Selective Control	---	.071	---	-.055	-.055
Compensatory Control	---	-.016	---	-.033	-.033

Model fit: χ^2=14.68, df=11, p=.198, NFI=.961, GFI=.981, RMSEA=.041

Note: *p<.05, **p<.01, ***p<.001

Table 43. Significant Paths Within the Model Testing the Utilization of CAM

Unstandardized Coefficients, Standardized Coefficients, Path Coefficients and Significance reported

Path	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
Co-Morbidity → Utilization of CAM	**-.032**	**1.197****	**-.008**	**.306****	**.314****
Age → Utilization of CAM	.112*	-.058	.117	-.060*	-.177
Age → ADL	-.040	-1.447***	-.010	-.345***	-.335***
Age → Co-Morbidity	.000	.117***	.000	.478***	.479***
Age → Social Welfare Related Knowledge	-.001	-.058**	-.002	-.203**	-.201**
Age → Attitudes towards Health Care	.026*	.061**	.087*	.205**	.118**
Age → Selective Control	-.124***	-.145**	-.169***	-.194**	-.027**
Education Level → ADL	.202	1.500***	.009	.244***	.235***
Education Level → Co-Morbidity	-.003	-.305***	-.003	-.237***	-.234***
Education Level →Social Welfare related Knowledge	-.015	.508***	-.010	.340***	.351***
Education Level → Selective Control	.433**	1.951*	.111**	.498*	.387*
Education Level → Compensatory Control	-.129	1.556*	-.012	.149*	.161*
Number of Children → Social Support	---	.569**	---	.234**	.234**
Number of Children →Social Welfare related Knowledge	-.015	-.167*	-.013	-.136*	-.123*
ADL → Selective Control	---	.056***	---	.314***	.314***

Note: *p<.05, **p<.01, ***p<.001

Table 44. Variables Testing the Utilization of Care Services

Unstandardized Coefficients, Path Coefficients and Significance reported

Variables	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
Predisposing Characteristics					
Age	.020***	.043***	.208***	.434***	.227***
Education Level	-.111***	-.076*	-.215***	-.147*	.068*
Number of Children	.001	.020	.003	.046	.042
Enabling Resources					
Household Expenditure	-.001	-.004	-.043	-.119	-.076
Social Support	.009	.007	.049	.042	-.007
Need Level					
ADL	-.002*	-.011***	-.080*	-.485***	-.405***
Co-Morbidity	.009	.033	.022	.082	.059
Psychological Characteristics					
Disease-related Knowledge	---	.005	---	.089	.089
Welfare related Knowledge	---	.035	---	.099	.099
Attitudes towards Health Care	---	.002	---	.007	.007
Selective Control	---	-.028**	---	-.215**	-.215**
Compensatory Control	---	-.006*	---	-.116*	-.116*

Model fit: χ^2=14.11, df=11, p=.227 , NFI=.973, GFI=.987, RMSEA=.038

Note: *p<.05, **p<.01, ***p<.001

Table 45. Significant Paths Within the Model Testing the Utilization of Care Services

Unstandardized Coefficients, Standardized Coefficients, Path Coefficients and Significance reported

Path	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
ADL → Utilization of Care Services	**-.002***	**-.011*****	**-.080***	**-.485*****	**-.405*****
Age → Utilization of Care Services	**.020*****	**.043*****	**.208*****	**.434*****	**.227*****
Selective Control → Utilization of Care Services	**---**	**-.028****	**---**	**-.215****	**-.215****
Compensatory Control → Utilization of Care Services	**---**	**-.006***	**---**	**-.116***	**-.116***
Education Level → Utilization of Care Services	**-.111*****	**-.076***	**-.215*****	**-.147***	**.068***
Age → ADL	-.040	-1.447***	-.010	-.345***	-.335***
Age → Co-Morbidity	.000	.117***	.000	.478***	.479***
Age → Social Welfare Related Knowledge	-.001	-.058**	.002	-.203**	-.201**
Age → Attitudes towards Health Care	.026*	.061**	.087	.205**	.118**
Age → Selective Control	-.120***	-.147**	-.162***	-.197**	-.036**
Education Level → ADL	.202	1.500***	.009	.244***	.235***
Education Level → Co-Morbidity	-.003	-.305***	-.003	-.237***	-.234***
Education Level →Social Welfare related Knowledge	-.015	.508***	-.010	.340***	.351***
Education Level → Selective Control	.424***	1.955*	.109***	.500*	.391*
Number of Children → Social Support	---	.569**	---	.234**	.234**
Number of Children →Social Welfare related Knowledge	-.015	-.167*	-.012	-.136*	-.123*
ADL → Selective Control	---	.054***	---	.304***	.304***

Note: *p<.05, **p<.01, ***p<.001

Table 46. Variables Testing Overall Health Care Utilization

Unstandardized Coefficients, Path Coefficients and Significance reported

Variables	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
Predisposing Characteristics					
Age	.174***	.010	.169***	.010	-.159
Education Level	-.559	.043	-.104	.008	.112
Number of Children	-.071	.346	-.016	.078	.093
Enabling Resources					
Household Expenditure	-.006	-.017	-.018	-.055	-.036
Social Support	.009	-.014	.005	-.008	-.013
Need Level					
ADL	-.006	-.024	-.023	-.099	-.076
Co-Morbidity	-.022	1.328***	-.005	.317***	.323***
Psychological Characteristics					
Disease-related Knowledge	---	.006	---	.011	.011
Welfare related Knowledge	---	.279	---	.077	.077
Attitudes towards Health Care	---	-.204	---	-.059	-.059
Selective Control	---	-.081	---	-.061	-.061
Compensatory Control	---	-.023	---	-.044	-.044
Model fit: χ^2=14.65, df=11, p=.199, NFI=.973, GFI=.987, RMSEA=.038					

Note: *p<.05, **p<.01, ***p<.001

Table 47. Significant Paths Within the Model Testing Overall Health Care Utilization

Unstandardized Coefficients, Standardized Coefficients, Path Coefficients and Significance reported

Path	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
Co-Morbidity → Overall Health Care Utilization	**-.022**	**1.328*** **	**-.005**	**.317*** **	**.323*** **
Age → Overall Health Care Utilization	.174***	.010	.169***	.010	-.159
Age → ADL	-.040	-1.447***	-.010	-.345***	-.335***
Age → Co-Morbidity	.000	.117***	.000	.478***	.479***
Age → Social Welfare Related Knowledge	-.001	-.058**	-.002	-.203**	-.201**
Age → Attitudes towards Health Care	.026*	.061**	.087	.205**	.118**
Age → Selective Control	-.124***	-.145**	-.166***	-.194**	-.028**
Education Level → ADL	.202	1.500***	.009	.244***	.235***
Education Level → Co-Morbidity	-.003	-.305***	-.003	-.237***	-.234***
Education Level → Social Welfare related Knowledge	-.015	.508***	-.010	.340***	.351***
Education Level → Selective Control	.433***	1.951*	.110***	.498*	.388*
Education Level → Compensatory Control	-.129	1.557*	-.012	.149*	.162*
Number of Children → Social Support	---	.569**	---	.234**	.234**
Number of Children →Social Welfare related Knowledge	-.015	-.167*	-.012	-.136*	-.123*
ADL → Selective Control	---	.056***	---	.314***	.314***

Note: *p<.05, **p<.01, ***p<.001

Table 48. Significant Variables Testing the Utilization of Medical Services, CAM, Care Services and Overall Health Care Utilization
(based on path analysis)

Varialbe	*Utilization of Medical Services*	*Utilization of CAM*	*Utilization of Care Services*	*Health Care Utilization*
Age	**(-)****		**(+)*****	
Education Level			**(+)***	
Number of Children				
Household Expenditure				
Social Support				
ADL	**(-)*****		**(-)*****	
Co-Morbidity		**(+)****		**(+)*****
Disease-related Knowledge				
Social Welfare related Knowledge				
Attitudes towards Health Care	**(+)***			
Selective Control			**(-)****	
Compensatory Control			**(-)***	

Note: *p<.05, **p<.01, ***p<.001

Table 49. Significant Paths Within the Model Testing HRQOL, Operated Through the Utilization of Medical Services

Unstandardized Coefficients, Standardized Coefficients, Path Coefficients and Significance reported

Path	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
Selective Control → HRQOL	**-.016**	**.688*** **	**-.006**	**.271*** **	**.277*** **
ADL → HRQOL	**.062***	**.145*** **	**.137***	**.321*** **	**.184*** **
Co-Morbidity → HRQOL	**-.341**	**.145***	**-.044**	**-.197***	**-.153***
Age → HRQOL	**-.368*** **	**-.509*** **	**-.194*** **	**-.269*** **	**-.075*** **
Education Level → HRQOL	**2.222*** **	**2.055*** **	**.223*** **	**.206*** **	**-.017*** **
ADL → Utilization of Medical Services	.000	-.020***	.009	-.584***	-.593***
Attitudes → Utilization of Medical Services	---	-.062*	---	.126*	.126*
Age → Utilization of Medical Services	.040***	.028***	.274***	.194***	-.080***
Education Level → Utilization of Medical Services	-.105*	-.107	-.137*	-.141	-.004
Age → ADL	-.040	-1.447***	-.010	-.345***	-.335***
Age → Co-Morbidity	.000	.117***	.000	.478***	.479***
Age → Welfare related Knowledge	-.001	-.058**	-.002	-.203**	-.201**
Age → Attitudes	.026*	.061**	.087	.205**	.118**
Age → Selective Control	-.127***	-.141**	-.170***	-.189**	-.019**
Education Level → ADL	.202	1.500***	.009	.244***	.235***
Education Level → Co-Morbidity	-.003	-.305***	-.003	-.237***	-.234***
Education Level → Welfare related Knowledge	-.015	.508***	-.010	.340***	.351***
Education Level → Selective Control	.441**	1.947***	.112**	.497***	.385***
Education Level → Compensatory Control	-.127	1.565*	-.012	.150*	.162*
Number of Children → Social Support	---	.569**	---	.234**	.234**
Number of Children → Welfare related Knowledge	-.015	-.167*	-.012	-.136*	-.123*
ADL → Selective Control	---	.057***	---	.320***	.320***

Note: *p<.05, **p<.01, ***p<.001

Table 50. Significant Paths Within the Model Testing HRQOL, Operated Through the Utilization of Medical Services and Depressive Symptoms

Unstandardized Coefficients, Standardized Coefficients, Path Coefficients and Significance reported

Path	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
Depressive Symptoms → HRQOL	**.024**	**-1.562*** **	**.010**	**-.612*** **	**-.622*** **
Age → HRQOL	**-.299** **	**-.509*** **	**-.158** **	**-.269*** **	**-.111*** **
Co-Morbidity → HRQOL	**-.883***	**-1.524***	**-.114***	**-.197***	**-.083***
Education Level → HRQOL	**2.792*** **	**2.055** **	**.280*** **	**.206** **	**-.074** **
ADL → HRQOL	**.126*** **	**.145*** **	**.279*** **	**.321*** **	**.042*** **
Selective Control → HRQOL	**.610*** **	**.690*** **	**.239*** **	**.270*** **	**.031*** **
Compensatory Control → HRQOL	.093**	.029	.097**	.030	-.067
ADL → Utilization of Medical Services	-.003	-.020***	-.074	-.584***	-.510***
Depressive Symptoms → Utilization of Medical Services	--	.050**	--	.255**	.255**
Attitudes → Utilization of Medical Services	.008	.062*	.016	.126*	.111*
Age → Utilization of Medical Services	.037***	.028***	.256***	.194***	-.062***
Selective Control → Utilization of Medical Services	-.019**	.019	-.097**	.094	.193
Education Level → Utilization of Medical Services	-.105*	-.107	-.137*	-.141	-.004
Compensatory Control → Utilization of Medical Services	-.003*	-.001	-.040*	-.014	.026
Selective Control → Depressive Symptoms	--	-.379***	--	-.379***	-.379***
ADL → Depressive Symptoms	-.023***	-.082***	-.132***	-.463***	-.331***
Compensatory Control → Depressive Symptoms	--	-.059***	--	-.157***	-.157***
Co-Morbidity → Depressive Symptoms	.150	.563**	.050	.186**	.137**
Education Level → Depressive Symptoms	-1.205***	-1.584***	-.309***	-.406***	-.097***
Age → Depressive Symptoms	.185***	.132**	.248***	.178**	-.071**
Age → ADL	-.040	-1.447***	-.010	-.345***	-.335***
Age → Co-Morbidity	.000	.117***	.000	.478***	.479***
Age → Welfare related Knowledge	-.001	-.058**	-.002	-.203**	-.201**
Age → Attitudes	.026*	.061**	.087	.205**	.118**
Age → Selective Control	-.125***	-.137**	-.168***	-.184**	-.016**
Education Level → ADL	.202	1.500***	.009	.244***	.235***
Education Level → Co-Morbidity	-.003	-.305***	-.003	-.237***	-.234***
Education Level → Welfare related Knowledge	-.015	.508***	-.010	.340***	.351***
Education Level → Selective Control	.443**	1.916***	.114**	.491***	.377***
Number of Children → Social Support	---	.569**	---	.234**	.234**
Number of Children → Welfare related Knowledge	-.015	-.167*	-.012	-.136*	-.123*
ADL → Selective Control	---	.056***	---	.318***	.318***

Note: *p<.05, **p<.01, ***p<.001

Table 51. Significant Paths Within the Model Testing HRQOL, Operated Through the Utilization of CAM

Unstandardized Coefficients, Path Coefficients and Significance reported

Path	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
Selective Control → HRQOL	**.000**	**.690*** **	**.000**	**.271*** **	**.271*** **
ADL → HRQOL	**.043***	**.145*** **	**.094***	**.321*** **	**.227*** **
Co-Morbidity → HRQOL	**-.283**	**1.524****	**-.037**	**-.197****	**-.161****
Age → HRQOL	**.112***	**-.509*** **	**-.201***	**-.269*** **	**-.068*** **
Education Level → HRQOL	**-.339**	**2.055****	**.224**	**.206****	**-.017****
Co-Morbidity → Utilization of CAM	-.032	1.197**	-.008	.306**	.314**
Age → Utilization of CAM	.112*	-.058	.117*	-.060	-.177
Age → ADL	-.040	-1.447***	-.010	-.345***	-.335***
Age → Co-Morbidity	.000	.117***	.000	.478***	.479***
Age → Social Welfare Related Knowledge	-.001	-.058**	-.002	-.203**	-.201**
Age → Attitudes towards Health Care	.026*	.061**	.087*	.205**	.118**
Age → Selective Control	.125***	-.143**	-.167***	-.192**	-.025**
Education Level → ADL	.202	1.500***	.009	.244***	.235***
Education Level → Co-Morbidity	-.003	-.305***	-.003	-.237***	-.234***
Education Level → Welfare related Knowledge	-.015	.508***	-.010	.340***	.351***
Education Level → Selective Control	.434**	1.955*	.111**	.499*	.388*
Education Level → Compensatory Control	-.130	1.556*	-.012	.149*	.161*
Number of Children → Social Support	---	.569**	---	.234**	.234**
Number of Children → Welfare related Knowledge	-.015	-.167*	-.012	-.136*	-.123*
ADL → Selective Control	---	.056***	---	.315***	.315***

Note: *p<.05, **p<.01, ***p<.001

Table 52. Significant Paths Within the Model Testing HRQOL, Operated Through the Utilization of CAM and Depressive Symptoms

Unstandardized Coefficients, Standardized Coefficients, Path Coefficients and Significance reported

Path	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
Depressive Symptoms → HRQOL	**.000**	**-1.560*** **	**.000**	**-.611*** **	**-.611*** **
Age → HRQOL	**-.293** **	**-.509*** **	**-.155** **	**-.269*** **	**-.114*** **
Co-Morbidity → HRQOL	**-.924***	**-1.524***	**-.120***	**-.197***	**-.078***
Education Level → HRQOL	**2.783*** **	**2.055** **	**.280*** **	**.206** **	**-.073** **
Selective Control → HRQOL	**.591*** **	**.692*** **	**.232*** **	**.271*** **	**.040*** **
ADL → HRQOL	**.134*** **	**.145*** **	**.297*** **	**.321*** **	**.024*** **
Compensatory Control → HRQOL	.092**	.030	.097**	.033	-.066
Co-Morbidity → Utilization of CAM	-.034	1.197**	-.009	.306**	.314**
Age → Utilization of CAM	.112*	-.058	.117*	-.060	-.177
Selective Control → Depressive Symptoms	--	-.379***	--	-.378***	-.378***
ADL → Depressive Symptoms	-.023***	-.082***	-.132***	-.463***	-.334***
Compensatory Control → Depressive Symptoms	--	-.059***	--	-.158***	-.158***
Co-Morbidity → Depressive Symptoms	.150	.563**	.050	.186**	.137**
Education Level → Depressive Symptoms	-1.217***	-1.584***	-.312***	-.406***	-.094***
Age → Depressive Symptoms	.187***	.132**	.252***	.178**	-.075**
Age → ADL	-.040	-1.447***	-.010	-.345***	-.335***
Age → Co-Morbidity	.000	.117***	.000	.478***	.479***
Age → Social Welfare Related Knowledge	-.001	-.058**	-.002	-.203**	-.201**
Age → Attitudes towards Health Care	.026*	.061**	.087*	.205**	.118**
Age → Selective Control	.122***	-.141**	-.165***	-.189**	-.024**
Education Level → ADL	.202	1.500***	.009	.244***	.235***
Education Level → Co-Morbidity	-.003	-.305***	-.003	-.237***	-.234***
Education Level → Welfare related Knowledge	-.015	.508***	-.010	.340***	.351***
Education Level → Selective Control	.433**	1.926*	.111**	.494*	.383*
Education Level → Compensatory Control	-.134	1.469*	-.013	.141*	.154*
Number of Children → Social Support	---	.569**	---	.234**	.234**
Number of Children → Welfare related Knowledge	-.015	-.167*	-.012	-.136*	-.123*
ADL → Selective Control	---	.055***	---	.312***	.312***

Note: *p<.05, **p<.01, ***p<.001

Table 53. Significant Paths Inherent the Model Testing HRQOL, Operated Through the Utilization of Care Services

Unstandardized Coefficients, Path Coefficients and Significance reported.

Path	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
Utilization of Care Services → HRQOL	**---**	**1.508*****	**---**	**-.337*****	**-.337*****
Selective Control → HRQOL	**.189***	**.687*****	**.071***	**.270*****	**.199*****
Co-Morbidity → HRQOL	**-.442**	**-1.524***	**-.055**	**-.197***	**-.143***
ADL → HRQOL	**.103*****	**.145*****	**.229*****	**.321*****	**.092*****
Age → HRQOL	**-.532*****	**-.509*****	**-.281*****	**-.269*****	**.012*****
Education Level → HRQOL	**2.019*****	**2.055****	**.203*****	**.206****	**.004****
ADL → Utilization of Care Services	-.002*	-.011***	-.080*	-.485***	-.406***
Age → Utilization of Care Services	.020***	.043***	.206***	.434***	.228***
Selective Control → Utilization of Care Services	---	-.028**	---	-.209**	-.209**
Compensatory Control → Utilization of Care Services	---	-.006*	---	-.117*	-.117*
Education Level → Utilization of Care Services	-.111***	-.076*	-.213***	-.147*	.065*
Age → ADL	-.040	-1.447***	-.010	-.345***	-.335***
Age → Co-Morbidity	.000	.117***	.000	.478***	.479***
Age → Social Welfare Related Knowledge	-.001	-.058**	.002	-.203**	-.201**
Age → Attitudes towards Health Care	.026*	.061**	.087	.205**	.118**
Age → Selective Control	.122***	-.145**	-.162***	-.195**	-.031**
Education Level → ADL	.202	1.500***	.009	.244***	.235***
Education Level → Co-Morbidity	-.003	-.305***	-.003	-.237***	-.234***
Education Level → Welfare related Knowledge	-.015	.508***	-.010	.340***	.351***
Education Level → Selective Control	.428***	1.957*	.109***	.500*	.391*
Number of Children → Social Support	---	.569**	---	.234**	.234**
Number of Children → Welfare related Knowledge	-.015	-.167*	-.012	-.136*	-.123*
ADL → Selective Control	---	.055***	---	.308***	.308***

Note: *p<.05, **p<.01, ***p<.001

Table 54. Significant Paths Within the Model Testing HRQOL, Operated Through the Utilization of Care Services and Depressive Symptoms

Unstandardized Coefficients, Standardized Coefficients, Path Coefficients and Significance reported

Path	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
Depressive Symptoms → HRQOL	**.024**	**-1.560*** **	**-.068**	**-.612*** **	**-.543*** **
Utilization of Care Services → HRQOL	**---**	**-1.479***	**---**	**-.162***	**-.162***
Co-Morbidity → HRQOL	**-.883***	**-1.524***	**-.118***	**-.197***	**-.079***
Age → HRQOL	**.375****	**-.509*** **	**-.198****	**-.269*** **	**-.071****
Education Level → HRQOL	**2.627*** **	**2.055****	**.264*** **	**.206****	**-.020****
ADL → HRQOL	**.126*** **	**.145*** **	**.341*** **	**.321*** **	**.042*** **
Selective Control → HRQOL	**.610*** **	**.692****	**.239*** **	**.271****	**.032****
Compensatory Control → HRQOL	.093**	.029	.105**	.031	-.074
Depressive Symptoms → Utilization of Care Services	---	.056***	---	.421***	.421***
ADL → Utilization of Care Services	-.005*	-.011***	-.219*	-.485***	-.266***
Age → Utilization of Care Services	.017*	.043***	.173***	.434***	.261***
Education Level → Utilization of Care Services	-.129***	-.076*	-.215***	-.147*	.101*
Compensatory Control → Utilization of Care Services	-.003**	-.006*	.066**	-.117*	-.050*
Selective Control → Utilization of Care Services	-.021***	-.027**	-.159***	-.205**	-.046**
Selective Control → Depressive Symptoms	--	-.379***	--	-.378***	-.378***
ADL → Depressive Symptoms	-.023***	-.082***	-.127***	-.463***	-.335***
Compensatory Control → Depressive Symptoms	--	-.059***	--	-.158***	-.158***
Co-Morbidity → Depressive Symptoms	.149	.563**	.049	.186**	.137**
Education Level → Depressive Symptoms	-1.219***	-1.584***	-.312***	-.406***	-.094***
Age → Depressive Symptoms	.188***	.132**	.253***	.178**	-.076**
Age → ADL	-.040	-1.447***	-.010	-.345***	-.335***
Age → Co-Morbidity	.000	.117***	.000	.478***	.479***
Age → Social Welfare Related Knowledge	-.001	-.058**	.002	-.203**	-.201**
Age → Attitudes towards Health Care	.026*	.061**	.087*	.205**	.118**
Age → Selective Control	-122**	-.141***	-.164**	-.190***	-.026***
Education Level → ADL	.202	1.500***	.009	.244***	.235***
Education Level → Co-Morbidity	-.003	-.305***	-.003	-.237***	-.234***
Education Level → Welfare related Knowledge	-.015	.508***	-.010	.340***	.351***
Education Level → Selective Control	.431***	1.928***	.111***	.495***	.384***
Number of Children → Social Support	---	.569**	---	.234**	.234**
Number of Children → Welfare related Knowledge	-.015	-.167*	-.012	-.136*	-.123*
ADL → Selective Control	---	.055***	---	.310***	.310***

Note: *p<.05, **p<.01, ***p<.001

Table 55. Significant Paths Within the Model Testing HRQOL, Operated Through Overall Health Care Utilization

Unstandardized Coefficients, Standardized Coefficients, Path Coefficients and Significance reported

Path	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
Selective Control → HRQOL	**.004**	**.690*** **	**.002**	**.271*** **	**.270*** **
ADL → HRQOL	**.044** **	**.145*** **	**.097** **	**.321*** **	**.224*** **
Co-Morbidity → HRQOL	**-.340**	**-1.524***	**-.044**	**-.197***	**-.153***
Age → HRQOL	**-.374*** **	**-.509*** **	**-.197*** **	**-.269*** **	**-.072*** **
Education Level → HRQOL	**2.203*** **	**2.055** **	**.221*** **	**.206** **	**-.015** **
Co-Morbidity → Health Care Utilization	-.022	1.328***	-.005	.317***	.323***
Age → Health Care Utilization	.173***	.010	.169***	.010	-.159
Age → ADL	-.040	-1.447***	-.010	-.345***	-.335***
Age → Co-Morbidity	.000	.117***	.000	.478***	.479***
Age → Social Welfare Related Knowledge	-.001	-.058**	-.002	-.203**	-.201**
Age → Attitudes towards Health Care	.026*	.061**	.087*	.205**	.118**
Age → Selective Control	-.125***	-.144**	-.167***	-.193**	-.025**
Education Level → ADL	.202	1.500***	.009	.244***	.235***
Education Level → Co-Morbidity	-.003	-.305***	-.003	-.237***	-.234***
Education Level → Welfare related Knowledge	-.015	.508***	-.010	.340***	.351***
Education Level → Selective Control	.434***	1.955*	.111***	.499*	.388*
Education Level → Compensatory Control	-.130	1.556*	-.012	.149*	.162*
Number of Children → Social Support	---	.569**	---	.234**	.234**
Number of Children → Welfare related Knowledge	-.015	-.167*	-.012	-.136*	-.123*
ADL → Selective Control	---	.056***	---	.315***	.315***

Note: *p<.05, **p<.01, ***p<.001

Table 56. Significant Paths Within the Model Testing HRQOL, Operated Through Overall Health Care Utilization and Depressive Symptoms

Unstandardized Coefficients, Standardized Coefficients, Path Coefficients and Significance reported

Path	*Indirect Effect*	*Total Effect*	*Standardized Indirect Effect*	*Standardized Total Effect*	*Path Coefficient*
Depressive Symptoms → HRQOL	**-.002**	**-1.560*** **	**-.001**	**-.611*** **	**-.611*** **
Age → HRQOL	**-.292** **	**-.509*** **	**-.154** **	**-.269*** **	**-.114*** **
Co-Morbidity → HRQOL	**-.934***	**-1.524***	**-.121***	**-.197***	**-.076***
Education Level → HRQOL	**2.778*** **	**2.055** **	**.279*** **	**.206** **	**-.073** **
Selective Control → HRQOL	**.591*** **	**.692*** **	**.232*** **	**.271*** **	**.040*** **
ADL → HRQOL	**.135*** **	**.145*** **	**.298*** **	**.321*** **	**.023*** **
Compensatory Control → HRQOL	.093**	.030	.097**	.031	-.066
Co-Morbidity → Overall Health Care Utilization	.018	1.328***	.004	.317***	.313***
Age → Overall Health Care Utilization	.168***	.010	.163***	.010	-.153
Selective Control → Depressive Symptoms	--	-.379***	--	-.378***	-.378***
ADL → Depressive Symptoms	-.023***	-.082***	-.129***	-.463***	-.331***
Compensatory Control → Depressive Symptoms	--	-.059***	--	-.158***	-.158***
Co-Morbidity → Depressive Symptoms	.148	.563**	.049	.186**	.137**
Education Level → Depressive Symptoms	-1.217***	-1.584***	-.312***	-.406***	-.094***
Age → Depressive Symptoms	.187***	.132**	.252***	.178**	-.075**
Age → ADL	-.040	-1.447***	-.010	-.345***	-.335***
Age → Co-Morbidity	.000	.117***	.000	.478***	.479***
Age → Social Welfare Related Knowledge	-.001	-.058**	-.002	-.203**	-.201**
Age → Attitudes towards Health Care	.026*	.061**	.087	.205**	.118**
Age → Selective Control	-.122***	-.141**	-.165***	-.189**	-.024**
Education Level → ADL	.202	1.500***	.009	.244***	.235***
Education Level → Co-Morbidity	-.003	-.305***	-.003	-.237***	-.234***
Education Level → Welfare related Knowledge	-.015	.508***	-.010	.340***	.351***
Education Level → Selective Control	.433***	1.927*	.110***	.494*	.383*
Education Level → Compensatory Control	-.134	1.470*	-.013	.141*	.154*
Number of Children → Social Support	---	.569**	---	.234**	.234**
Number of Children → Welfare related Knowledge	-.015	-.167*	-.012	-.136*	-.123*
ADL → Selective Control	---	.055***	---	.311***	.311***

Note: *p<.05, **p<.01, ***p<.001

Table 57. Paths with Direct Effects on HRQOL

Operated through the Utilization of Medical Services	Operated through the Utilization of CAM	Operated through the Utilization of Care Services	Operated through Overall Health Care Utilization
Age (−) → HRQOL	Age (−) → HRQOL	Age (+) → HRQOL	Age (−) → HRQOL
Education Level (−) → HRQOL	Education Level (−) → HRQOL	Education Level (+) → HRQOL	Education Level (−) → HRQOL
ADL (+) → HRQOL	ADL (+) → HRQOL	ADL (+) → HRQOL	ADL (+) → HRQOL
Co-Morbidity (−) → HRQOL	Co-Morbidity (−) → HRQOL	Co-Morbidity (−) → HRQOL	Co-Morbidity (−) → HRQOL
Selective Control (+) → HRQOL	Selective Control (+) → HRQOL	Selective Control (+) → HRQOL	Selective Control (+) → HRQOL
		Utilization of Care Services (−) → HRQOL	

Operated through the Utilization of Medical Services and Depressive Symptoms	Operated through the Utilization of CAM and Depressive Symptoms	Operated through the Utilization Of Care Services and Depressive Symptoms	Operated through Overall Health Care Utilization and Depressive Symptoms
Age (−) → HRQOL	Age (−) → HRQOL	Age (−) → HRQOL	Age (−) → HRQOL
Education Level (−) → HRQOL	Education Level (−) → HRQOL	Education Level (−) → HRQOL	Education Level (−) → HRQOL
ADL (+) → HRQOL	ADL (+) → HRQOL	ADL (+) → HRQOL	ADL (+) → HRQOL
Co-Morbidity (−) → HRQOL	Co-Morbidity (−) → HRQOL	Co-Morbidity (−) → HRQOL	Co-Morbidity (−) → HRQOL
Selective Control (+) → HRQOL	Selective Control (+) → HRQOL	Selective Control (+) → HRQOL	Selective Control (+) → HRQOL
Depressive Symptoms (−) → HRQOL	Depressive Symptoms (−) → HRQOL	Depressive Symptoms (−) → HRQOL	Depressive Symptoms (−) → HRQOL
		Utilization of Care Services (−) → HRQOL	

Table 58. Paths with Indirect Effects on HRQOL

	Path with Indirect Effects
HRQOL Operated through the Utilization of Medical Services	■ Age (−) → ADL (+) → Selective Control (+) → HRQOL ■ Age (+) → Co-Morbidity (−) → HRQOL ■ Education Level (+) → ADL (+) → Selective Control (+) → HRQOL ■ Education Level (−) → Co-Morbidity (−) → HRQOL
HRQOL Operated through the Utilization of CAM	■ Age (−) → ADL (+) → Selective Control (+) → HRQOL ■ Age (+) → Co-Morbidity (−) → HRQOL ■ Education Level (+) → ADL (+) → Selective Control (+) → HRQOL ■ Education Level (−) → Co-Morbidity (−) → HRQOL
HRQOL Operated through the Utilization of Care Services	■ Age (−) → ADL (+) → Selective Control (−) → Utilization of Care Services (−) → HRQOL ■ Age (+) → Co-Morbidity (−) → HRQOL ■ Education Level (+) → ADL (+) → Selective Control (−) → Utilization of Care Services (−)→ HRQOL ■ Education Level (−) → Co-Morbidity (−) → HRQOL
HRQOL Operated through Overall Health Care Utilization	■ Age (−) → ADL (+) → Selective Control (+) → HRQOL ■ Age (+) → Co-Morbidity (−) → HRQOL ■ Education Level (+) → ADL (+) → Selective Control (+) → HRQOL ■ Education Level (−) → Co-Morbidity (−) → HRQOL

Table 58, continued (page 2 of 2)

	Path with Indirect Effects
HRQOL Operated through the Utilization of Medical Services and Depressive Symptoms	■ Age (−) → ADL (+) → Selective Control (−) → Depressive Symptoms (−) → HRQOL ■ Age (+) → Co-Morbidity (+) → Depressive Symptoms(−) → HRQOL ■ Education Level (+) → ADL (+) → Selective Control (−) → Depressive Symptoms (−) → HRQOL ■ Education Level (−) → Co-Morbidity (+) → Depressive Symptoms (−) → HRQOL
HRQOL Operated through the Utilization of CAM and Depressive Symptoms	■ Age (−) → ADL (+) → Selective Control (−) → Depressive Symptoms (−) → HRQOL ■ Age (+) → Co-Morbidity (+) → Depressive Symptoms (−) → HRQOL ■ Education Level (+) → ADL (+) → Selective Control (−) → Depressive Symptoms (−) → HRQOL ■ Education Level (−) → Co-Morbidity (+) → Depressive Symptoms (−) → HRQOL
HRQOL Operated through the Utilization of Care Services and Depressive Symptoms	■ Age (−) → ADL (+) → Selective Control (−) → Depressive Symptoms (+) →Utilization of Care Services ((−) → HRQOL ■ Age (+) → Co-Morbidity (+) → Depressive Symptoms (+) →Utilization of Care Services (−) → HRQOL ■ Education Level (+) → ADL (+) → Selective Control (−) →Depressive Symptoms (+) → Utilization of Care Services (−) → HRQOL ■ Education Level (−) → Co-Morbidity (+) → Depressive Symptoms (+) →Utilization of Care Services (−) → HRQOL
HRQOL Operated through Overall Health Care Utilization and Depressive Symptoms	■ Age (−) → ADL (+) → Selective Control (−) → Depressive Symptoms (−) → HRQOL ■ Age (+) → Co-Morbidity (+) → Depressive Symptoms (−) → HRQOL ■ Education Level (+) → ADL (+) → Selective Control (−) → Depressive Symptoms (−) → HRQOL ■ Education Level (−) → Co-Morbidity (+) → Depressive Symptoms (−) → HRQOL

APPENDICES

Appendix A: List of Names of Experts for Questionnaire Review

- Prof. Emeritus Isaak Chung-Pei LI

  Department of Social Work, California State University, Long Beach, USA

- Prof. Dr. Jin Ding LIN, Director

  School of Public Health, National Defense Medical Center, Taipei, TAIWAN

- Prof. Dr. med. Chin-Hwe LOH

  National Defense Medical Center, Taipei, TAIWAN

- Associate Prof. Dr. H. Tung

  Department of Health Administration, Asia University

- Dr. med. Zhou-Jong HU

  Department of Neurology, Taipei Medical University Hospital

- Dr. Ju-Tai LI

  Department of Neurology, Tri-Serve General Hospital

- Pei-Rong HSU (MS), Head Nurse

  Tri-Serve General Hospital

- Ying Shou LIN (MS), Social Worker

  Xin-Rong Senior Retirement Home, Taipei City Government

Appendix B: Study Questionnaire

STUDY CONCENT FORM

Understanding Health Care Utilization of Older Adults with Parkinson's Disease in Taiwan

Investigator: Leu
Phone number: 0921-075-156

The investigator will conduct this study using the principles of governing the ethical conduct of research, and at all times, will protect the interests, comfort and safety of all participants.

My signature below will indicate that:

1. The procedures involved in this study have been explained to me and I have been given the possibility to ask questions regarding this study.
2. I acknowledge that:
   (a) The study is only for purpose of research.
   (b) I have been informed that I am free to withdraw from the study at any time and without comment or penalty.
   (c) I have been informed that the confidentiality of the information I provide will be safeguarded.
3. I consent to participate in this study.

Participant: _____ Date: _____

(signature)

Sample No.

Hospital Code			**Serial Number**		

(This page will be filled by the interviewer)

Understanding Health Care Utilization of Older Adults with Parkinson's Disease in Taiwan

- Completeness of the questionnaire:
  - □ All questions are completed
  - □ Other situation

  (Please describe :_____)

- Had you called to make the interview appointment?
  - □ Yes
  - □ No
  - □Other situation

  (Please describe :_____)

- Who fill this form?
  - □ Interviewer
  - □ Others

  (Please describe :_____)

- Interview duration: from_____ to_____

  (total : _____ minutes)

- Name of interviewer:_____

- Date: _____

Understanding Health Care Utilization of Older Adults with Parkinson's Disease in Taiwan

– INSTRUCTIONS –

1. This questionnaire asked for your health care utilization patterns associated with living with Parkinson's Disease.
2. **ANSWER EVERY QUESTION** by responding as indicated. Your individual answers will remain confidential and not be shared with anyone else.
3. There are no right or wrong answers. If you are unsure how to answer the question please give the best answer you can.
4. Some questions may look alike, however, please answer each question.
5. Check the completed questionnaire. It would be really helpful if you could take a couple of minutes to check that every question has been answered as indicated.
6. Please hand in the completed questionnaire to the data collector or later the data collector will contact you to collect it.

Please tick √ your answer.

SECTION I : DEMOGRAPHICS

1. Gender: □(1) Male □(2) Female
2. How old are you? _____ years
3. Education: □(1) Illiteracy □(2) Primary school □(3) Junior high school
   □(4) Senior high school □(5) College and above
4. Marital status: □(1) Married □(2) Widower/Widow □(3) Divorced □(4) Single
5. How many children do you have? _____
6. Living arrangement: □(1) Alone □(2) Living with spouse only
   □(3) Living with family members
   □(4) In a retirement community
   □(5) In a care facility □(6) Others
7. Your household expenses in month are about:
   □(1) <20000 NTD □(2) 20000-39999 NTD □(3) 40000-59999 NTD
   □(4) 60000-79999 NTD □(5) >80000 NTD
8. Do you think your current financial situation is :
   □(1) Very comfortable □(2) Comfortable □(3) I have to be careful but I get by
   □(4) Difficult □(5) Very difficult
9. Do you have the Handicapped Certificate?
   □(1) Yes *(please go to question 9-1 and 9-2)*
   □(2) No *(please go to next page)*
   9-1 What kind of handicap do you have?
   □(1) Balancing mechanism disability □(2) Limb disability
   □(3) Mental disability □(4) Multiple disability □(5) Others
   9-2 Which level is your disability?
   □(1) Mild □(2) Moderate □(3) Severe □(4) Profound

SECTION II : HEALTH STATUS AND SUPPORT

1. ***Can you carry out the following activities?***

Can you make a phone call?	□(1)Yes	□(2)Need help	□(3) Can not
Can you go for walk?	□(1)Yes	□(2)Need help	□(3) Can not
Can you go shopping?	□(1)Yes	□(2)Need help	□(3) Can not
Can you prepare meals?	□(1)Yes	□(2)Need help	□(3) Can not
Can you do household chores?	□(1)Yes	□(2)Need help	□(3) Can not
Can you take buses?	□(1)Yes	□(2)Need help	□(3) Can not
Can you take medications?	□(1)Yes	□(2)Need help	□(3) Can not
Can you deal with finances?	□(1)Yes	□(2)Need help	□(3) Can not

■ ***Due to having Parkinson's disease, how Often DURING LAST MONTH have you***

2. Had difficulty getting around in public?

□(1) Never □(2) Occasionally □(3) Sometimes □(4) Often □(5) Always

3. Had difficulty dressing yourself?

□(1) Never □(2) Occasionally □(3) Sometimes □(4) Often □(5) Always

4. Felt depressed?

□(1) Never □(2) Occasionally □(3) Sometimes □(4) Often □(5) Always

5. Felt embarrassed in public due to having Parkinson's disease?

□(1) Never □(2) Occasionally □(3) Sometimes □(4) Often □(5) Always

6. Had problems with your close personal relationship?

□(1) Never □(2) Occasionally □(3) Sometimes □(4) Often □(5) Always

7. Had problems with your concentration, e.g. when reading or watching TV?

□(1) Never □(2) Occasionally □(3) Sometimes □(4) Often □(5) Always

8. Felt unable to communicate with people properly?

□(1) Never □(2) Occasionally □(3) Sometimes □(4) Often □(5) Always

9. Had painful muscle cramps or spasms?

□(1) Never □(2) Occasionally □(3) Sometimes □(4) Often □(5) Always

10. How long do you become the diagnosis of Parkinson's disease? _____(years)

11. Which PD symptoms do you have?

□(1) Unilateral

□(2) Bilateral, without impairment of balance

□(3) Bilateral; some postural instability; physically independent

□(4) Severe disability; still able to walk or stand unassisted

□(5) Wheel chair bound or bedridden unless aided

12. Do you have any chronic health issues despite of Parkinson's disease?

□(1) Yes, I have □(2) No, I don't have

13. What kind of chronic health issues do you have besides Parkinson's disease?

□(1) Diabetes □(2) High blood pressure □(3) Heart or circulation problems

□(4) Stroke □(5) Any variety of cancer □(6) Arthritis or rheumatism

□(7) Gout □(8) Liver illness □(9) Urological diseases

□(10) Asthma or chest problems □(11) Digestive diseases

□(12) Ophthalmic problems □(13) Hearing problems

□(14) Other specified health issues

■ ***How often is each kind of the following kinds of support available to you if you need it?***

14. Someone to help you if you were confined to bed.

□(1)Never □(2)Occasionally □(3) Sometimes □(4) Often □(5) Always

15. Someone to take you to the doctor if you needed it.

□(1)Never □(2)Occasionally □(3) Sometimes □(4) Often □(5) Always

16. Someone to prepare you meals if you were unable to do it yourself.

□(1)Never □(2)Occasionally □(3) Sometimes □(4) Often □(5) Always

17. Someone to help with daily chores if you were sick.

□(1)Never □(2)Occasionally □(3) Sometimes □(4) Often □(5) Always

18. Someone to give you information to help you understand the disease-relevant situation?

□(1)Never □(2)Occasionally □(3) Sometimes □(4) Often □(5) Always

SECTION III: RELATED KNOWLEDGE AND ATTITUDES TOWARDS HEALTH SERVICES

1. Do you agree with the following statement?

   "Because of the chronic nature of Parkinson's disease, patients should take medication in a long term?"

   □(1) Strongly agree □(2) Moderately agree □(3) Agree

   □(4) Disagree □(5) Moderately disagree □(6) Strongly disagree

2. Do you agree with the following statement?

   "Paying regular visits to the neurological out-patient department would help to keep the progress of Parkinson's disease under control?"

   □(1) Strongly agree □(2) Moderately agree □(3) Agree

   □(4) Disagree □(5) Moderately disagree □(6) Strongly disagree

3. Do you think that patients with PD need rehabilitation?

   □(1) No □(2) Yes

4. Do you know that patients with PD can apply for the handicapped ID?

   □(1) No □(2) Heard of it, but not well-informed □(3) Yes

5. Do you know holders of the handicapped ID can apply for health insurance subsidy？

   □(1) No □(2) Heard of it, but not well-informed □(3) Yes

6. Do you know that patients with PD can apply for social care services, such as home care/home help/ meals on wheels/ and (or) transportation services?

   □(1) No □(2) Heard of it, but not well-informed □(3) Yes

7. Who arranges mostly health care services for you?

   □(1) On your own □(2) Spouse □(3) Son & daughter-in-law

   □(4) Daughter & son-in-law □(5) Friends

   □(6) Other

8. To what extent do you agree with the following statements? *„If you wait long enough, you can get over almost any disease without seeing a doctor."*

   □(1) Strongly agree □(2) Moderately agree □(3) Agree

   □(4) Disagree □(5) Moderately disagree □(6) Strongly disagree

9. *„I avoid seeing a doctor whenever possible."*

   □(1) Strongly agree □(2) Moderately agree □(3) Agree

   □(4) Disagree □(5) Moderately disagree □(6) Strongly disagree

10. *„I only go to a doctor if there is no other option."*

    □(1) Strongly agree □(2) Moderately agree □(3) Agree

    □(4) Disagree □(5) Moderately disagree □(6) Strongly disagree

SECTION VI : HEALTH MANAGEMENT

To what extent does each of the following statements apply to you?

For each statement, please indicate the extent to which of the following statements usually applies to you during the past year.

1 :Almost Never true, 2: seldom true, 3: Sometimes true, 4: Often true, 5: almost/Always true

		1	2	3	4	5
1.	I am able to manage the stress in my life.	□	□	□	□	□
2.	I am able to manage any physical pain that I have.	□	□	□	□	□
3.	I am able to ask for help or accommodations when needed.	□	□	□	□	□
4.	I keep a balance in taking care of my physical, emotional, and spiritual health.	□	□	□	□	□
5.	I invest as much time and energy as possible to improve my health.	□	□	□	□	□
6.	Even if my health is in very difficult condition, I can find something positive in life.	□	□	□	□	□
7.	If I develop a new health problem, I immediately get help from a health professional (e.g., doctor, nurse).	□	□	□	□	□
8.	When I decide to do something about a health problem, I am confident that I will achieve it.	□	□	□	□	□
9.	I do whatever is necessary to be as healthy as I possibly can be.	□	□	□	□	□
10.	When a treatment doesn't work for a health problem I have, I try hard to find out about other treatments.	□	□	□	□	□
11.	When I am faced with a bad health problem, I try to look at the bright side of things.	□	□	□	□	□
12.	Once I decide what I need to do to improve my health, I avoid things that could distract me from doing these things.	□	□	□	□	□
13.	If I have a health problem that gets worse, I put in even more effort to get better.	□	□	□	□	□
14.	When I first notice a health problem, I try to get as much advice as I can from people who might know something about the problem.	□	□	□	□	□
15.	When I find it impossible to overcome a health problem, I try not to blame myself.	□	□	□	□	□
16.	I often think about how important good health is to me.	□	□	□	□	□

SECTION V : HEALTH CARE UTILIZATION

We would like to know how much use you have made of the health care services because of your Parkinson's disease. If you are not exactly sure, we would rather have your best guess than no information at all. Please answer every question.

1. When you would like to receive treatment **<u>because of your Parkinson's disease</u>**, where would you go to?

   □(1) Medical Center

   □(2) Regional Hospital

   □(3) District Hospital

   □(4) Others

2. Which medical department(s) do you visit mostly?

□(1) Neurology	□(2) Movement Disorder	□(3) Internal Medicine
□(4) Orthopedics	□(5) Rehabilitation	□(6) Neurological Surgery
□(7) Surgery	□(8) Dental apartment	□(9) Ophthalmology
□(10) Gastroenterology	□(11) Dermatology	□(12) Urology
□(13) Gynecology	□(14) Family Medicine	□(15) Others

3. Do you have one parson you think of as your personal PD doctor?

   □ No □ Yes

4. Do you have any problems to find someone coming along with you to see a doctor?

   □ No □ Yes

5. Do you have any problems with the transportation to see a doctor?

   □ No □ Yes

6. Do you have any problems with the cost of seeing a doctor?

   □ No □ Yes

7. OVER THE LAST 3 MONTHS, have you ever paid any visits to emergency rooms?

   □ No □ Yes

10. OVER THE LAST 3 MONTHS, have you had any overnight hospital stays?

    □ No □ Yes

11. <u>Because of your Parkinson's disease</u>, have you over the last 3 months visited a hospital out-patient clinic? □ No □ Yes

12. <u>Because of your Parkinson's disease</u>, have you over the last 3 months visited a physiotherapist in a clinic? □ No □ Yes

13. Because of your Parkinson's disease, have you over the last 3 months ever got a chronic illness prescription refill slip? □ No □ Yes

14. Because of your Parkinson's disease, have you over the last 3 months ever consulted providers of alternative medicine (e.g., healer, naturopath, massage, acupuncturist…)? □ No □ Yes

15. Because of your Parkinson's disease, have you over the last 3 months ever used supplemental health food? □ No □ Yes

16. OVER THE LAST 3 MONTHS, have you ever used supportive devices such as a cane, a wheelchair or a special bed? □ No □ Yes

17. OVER THE LAST 3 MONTHS, do you have a foreign domestic worker? □ No □ Yes

18. OVER THE LAST 3 MONTHS, have you ever used social care services? □ No □ Yes

SECTION VI : WELL-BEING

We would like to know how you have felt over the past week.

Please answer every question.

1.	Are you basically satisfied with your life?	□No	□Yes
2.	Have you dropped many of your activities and interests	□No	□Yes
3.	Do you feel that your life is empty?	□No	□Yes
4.	Do you often get bored?	□No	□Yes
5.	Are you in good spirits most of the time?	□No	□Yes
6.	Are you afraid that something bad is going to happen to you?	□No	□Yes
7.	Do you feel happy most of the time?	□No	□Yes
8.	Do you often feel helpless?	□No	□Yes
9.	Do you prefer to stay at home, rather than going out and doing new things?	□No	□Yes
10.	Do you feel you have more problems with memory than most?	□No	□Yes
11.	Do you think it is wonderful to be alive now?	□No	□Yes
12.	Do you feel pretty worthless the way you are now?	□No	□Yes
13.	Do you feel full of energy?	□No	□Yes
14.	Do you feel that your situation is hopeless?	□No	□Yes
15.	Do you think that most people are better off than you are?	□No	□Yes

SECTION VII : QUALITY OF LIFE

We would like to know how your health issues have impact on your activities of daily living. Please answer every question.

1. In general, would you say your health is:
   □(1) Excellent □(2) Very good □(3) Good □(4) Fair □(5) Poor

2. Do you have any limitations in moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf?
   □(1) Yes, a lot □(2) Yes, some limitations □(3) No, no limitations

3. Do you have any limitations in climbing 2 stories of stairs?
   □(1) Yes, a lot □(2) Yes, some limitations □(3) No, no limitations

4. During the past 4 weeks, have you accomplished less than you would like as a result of your physical health?
   □(1) Never □(2) Seldom □(3) Sometimes □(4) Often □(5) Always

5. During the past 4 weeks, were you limited in the kind of work or other regular daily activities you do as a result of your physical health?
   □(1) Never □(2) Seldom □(3) Sometimes □(4) Often □(5) Always

6. During the past 4 weeks, have you accomplished less than you would like as a result of any emotional problems, such as feeling depressed or anxious?
   □(1) Never □(2) Seldom □(3) Sometimes □(4) Often □(5) Always

7. During the past 4 weeks, did you not do work or other regular activities as carefully as usual as a result of any emotional problems, such as feeling depressed or anxious?
   □(1) Never □(2) Seldom □(3) Sometimes □(4) Often □(5) Always

8. During the past 4 weeks, how much did pain interfere with your normal work, including both work outside the home and housework? Did it interfere not at all, a little bit, moderately, quite a bit, or extremely?
   □(1) Never □(2) Seldom □(3) Sometimes □(4) Often □(5) Always

9. How much of the time during the past 4 weeks have you felt calm and peaceful?
   □(1) Never □(2) Seldom □(3) Sometimes □(4) Often □(5) Always

10. How much of the time during the past 4 weeks did you have a lot of energy?
    □(1) Never □(2) Seldom □(3) Sometimes □(4) Often □(5) Always

11. How much of the time during the past 4 weeks have you felt downhearted and blue?
    □(1) Never □(2) Seldom □(3) Sometimes □(4) Often □(5) Always

12. How much of the time have your physical or emotional problems interfered with your social activities, like visiting with friends or relatives?
    □(1) Never □(2) Seldom □(3) Sometimes □(4) Often □(5) Always

THANK YOU FOR YOUR TIME AND COOPERATION!!

Appendix C: Zero-Order Correlations

Table C1. Zero-Order Correlations for the Final Variables Used in the Path Analysis Testing the Utilization of CAM (I)

	1	2	3	4	5	6	7	8	9	10	11	12	13
14. Age	—	-.023	.293**	.270**	.130	-.358**	.494**	.250**	-.233**	.246**	-.172*	-.044	.452**
15. Education Level		—	-.345**	.137	-.009	.284**	-.285**	-.110	.388**	-.146	.499**	.469**	-.159*
16. Number of Children			—	.418**	.266**	-.216**	.236**	.156*	-.300**	.231**	-.259**	-.320**	.156*
17. Household Expenditure				—	.357**	-.151*	.142	.129	-.152*	.163*	.040	.074	.216**
18. Social Support					—	-.199**	.091	.072	-.128	.061	-.077	-.065	.068
6. ADL						—	-.622**	-.292**	.127	-.284**	.561**	.476**	-.497**
7. Co-Morbidity							—	.352**	-.223**	.328**	-.476**	-.322**	.551**
8. DI. Knowledge [a]								—	.088	.579**	-.238**	-.131	.424**
9. SW. Knowledge [a]									—	-.036	.265**	.230**	-.023
10. Attitudes										—	-.280**	-.121	.421**
11. Selective Control											—	.847**	-.352**
12. Compensatory Control												—	-.182*
13. Utilization of CAM													—

Note.
[a]: DI. Knowledge=disease-related knowledge; SW. Knowledge=social welfare related knowledge
*p<.05, **p<.01

Table C2. Zero-Order Correlations for the Final Variables Used in the Path Analysis Testing the Utilization of Care Services (I)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	—	-.029	.290**	.269**	.133	-.356**	.477**	.255**	-.238**	.255**	-.169*	-.042	.470**
2. Education Level		—	-.344**	.136	-.011	.284**	-.278**	-.113	.391**	-.151*	.497**	.468**	-.199**
3. Number of Children			—	.418**	.265**	-.216**	.236**	.155*	-.299**	.229**	-.259**	-.321**	.207**
4. Household Expenditure				—	.357**	-.151*	.141	.129	-.153*	.163*	.040	.074	.265**
5. Social Support					—	-.199**	.088	.074	-.130	.064	-.076	-.065	.129
6. ADL						—	-.619**	-.292**	.127	-.283**	.561**	.476**	-.649**
7. Co-Morbidity							—	.344**	-.216**	.315**	-.475**	-.322**	.527**
8. DI. Knowledge [a]								—	.084	.581**	-.237**	-.130	.294**
9. SW. Knowledge [a]									—	-.042	.263**	.229**	-.080
10. Attitudes										—	-.277**	-.119	.271**
11. Selective Control											—	.847**	-.525**
12. Compensatory Control												—	-.370**
13. Utilization of Care Services													—

Note.
[a]: DI. Knowledge=disease-related knowledge; SW. Knowledge=social welfare related knowledge
*p<.05, **p<.01

Table C3. Zero-Order Correlations for the Final Variables Used in the Path Analysis Testing Overall Health Care Utilization (I)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	—	-.023	.035	.114	.066	-.358**	.494**	.250**	-.233**	.246**	-.172*	-.044	.447**
2. Education Level		—	-.077	-.093	-.207**	.284**	-.285**	-.110	.388**	-.146	.499**	.469**	-.226**
3. Number of Children			—	-.002	.066	-.216**	.236**	.156*	-.300**	.231**	-.259**	-.320**	.246**
4. Household Expenditure				—	-.054	-.151*	.142	.129	-.152*	.163*	.040	.074	.223**
5. Social Support					—	-.199**	.091	.072	-.128	.061	-.077	-.065	.164*
6. ADL						—	-.622**	-.292**	.127	-.284**	.561**	.476**	-.742**
7. Co-Morbidity							—	.352**	-.223**	.328**	-.476**	-.322**	.632**
8. DI. Knowledge [a]								—	.088	.579**	-.238**	-.131	.407**
9. SW. Knowledge [a]									—	-.036	.265**	.230**	-.059
10. Attitudes										—	-.280**	-.121	.419**
11. Selective Control											—	.847**	-.470**
12. Compensatory Control												—	-.354**
13. Overall Health Care Utilization													—

Note.
[a]: DI. Knowledge=disease-related knowledge; SW. Knowledge=social welfare related knowledge
*p<.05, **p<.01

Table C4. Zero-Order Correlations for the Final Variables Used in the Path Analysis Testing HRQOL (I)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Age	—	-.030	.029	.110	.061	-.358**	.478**	.256**	-.238**	.257**	-.170*	-.043	.227**	.209**	-.395**
2. Education Level		—	-.071	-.090	-.202**	.282**	-.278**	-.113	.395**	-.148*	.497**	.467**	-.191*	-.453**	.400**
3. Number of Children			—	.000	.068	-.218**	.236**	.156*	-.298**	.231**	-.260**	-.322**	.238**	.242**	-.301**
4. Household Expenditure				—	-.049	-.161*	.144	.132	-.146*	.173*	.037	.071	.117	-.007	-.111
5. Social Support					—	-.202**	.088	.074	-.128	.066	-.077	-.066	.191**	-.039	-.034
6. ADL						—	-.619**	-.292**	.132	-.280**	.561**	.475**	-.669**	-.643**	.732**
7. Co-Morbidity							—	.344**	-.217**	.315**	-.475**	-.321**	.479**	.538**	-.644**
8. DI. Knowledge [a]								—	.083	.581**	-.237**	-.130	.271**	.335**	-.445**
9. SW. Knowledge [a]									—	-.046	.265**	.231**	-.052	-.137	.097
10. Attitudes										—	-.276**	-.118	.302**	.301**	-.384**
11. Selective Control											—	.847**	-.332**	-.688**	.695**
12. Compensatory Control												—	-.334**	-.623**	.584**
13. Utilization of Medical Services													—	.504**	-.545**
14. Depressive Symptoms														—	-.892**
15. HRQOL															—

Note.
[a]: DI. Knowledge=disease-related knowledge; SW. Knowledge=social welfare related knowledge
*p<.05, **p<.01

Table C5. Zero-Order Correlations for the Final Variables Used in the Path Analysis Testing HRQOL (II)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Age	—	-.024	.037	.115	.067	-.360**	.494**	.250**	-.233**	.248**	-.173*	-.044	.452**	.212**	-.398**
2. Education Level		—	-.074	-.092	-.205**	.282**	-.285**	-.109	.393**	-.143	.498**	.468**	-.158*	-.454**	.400**
3. Number of Children			—	.000	.068	-.218**	.237**	.157*	-.299**	.234**	-.260**	-.322**	.156*	.242**	-.301**
4. Household Expenditure				—	-.049	-.161*	.145	.132	-.146	.173*	.037	.071	.220**	-.006	-.111
5. Social Support					—	-.202**	.092	.072	-.126	.063	-.078	-.066	.069	-.039	-.034
6. ADL						—	-.623**	-.292**	.131	-.281**	.561**	.476**	-.496**	-.643**	.732**
7. Co-Morbidity							—	.352**	-.225**	.328**	-.476**	-.322**	.551**	.539**	-.647**
8. DI. Knowledge [a]								—	.088	.579**	-.238**	-.131	.423**	.336**	-.446**
9. SW. Knowledge [a]									—	-.040	.267**	.232**	-.025	-.138	.097
10. Attitudes										—	-.279**	-.120	.421**	.304**	-.386**
11. Selective Control											—	.847**	-.351**	-.688**	.695**
12. Compensatory Control												—	-.181*	-.623**	.584**
13. Utilization of CAM													—	.455**	-.590**
14. Depressive Symptoms														—	-.893**
15. HRQOL															—

Note.
[a]: DI. Knowledge=disease-related knowledge; SW. Knowledge=social welfare related knowledge
*p<.05, **p<.01

Table C6. Zero-Order Correlations for the Final Variables Used in the Path Analysis Testing HRQOL (III)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Age	—	-.024	.037	.115	.067	-.360**	.494**	.250**	-.233**	.248**	-.173*	-.044	.452**	.212**	-.398**
2. Education Level		—	-.074	-.092	-.205**	.282**	-.285**	-.109	.393**	-.143	.498**	.468**	-.158*	-.454**	.400**
3. Number of Children			—	.000	.068	-.218**	.237**	.157*	-.299**	.234**	-.260**	-.322**	.156*	.242**	-.301**
4. Household Expenditure				—	-.049	-.161*	.145	.132	-.146	.173*	.037	.071	.220**	-.006	-.111
5. Social Support					—	-.202**	.092	.072	-.126	.063	-.078	-.066	.069	-.039	-.034
6. ADL						—	-.623**	-.292**	.131	-.281**	.561**	.476**	-.496**	-.643**	.732**
7. Co-Morbidity							—	.352**	-.225**	.328**	-.476**	-.322**	.551**	.539**	-.647**
8. DI. Knowledge [a]								—	.088	.579**	-.238**	-.131	.423**	.336**	-.446**
9. SW. Knowledge [a]									—	-.040	.267**	.232**	-.025	-.138	.097
10. Attitudes										—	-.279**	-.120	.421**	.304**	-.386**
11. Selective Control											—	.847**	-.351**	-.688**	.695**
12. Compensatory Control												—	-.181*	-.623**	.584**
13. Utilization of Care Services													—	.455**	-.590**
14. Depressive Symptoms														—	-.893**
15. HRQOL															—

Note.
[a]: DI. Knowledge=disease-related knowledge; SW. Knowledge=social welfare related knowledge
*p<.05, **p<.01

Table C7. Zero-Order Correlations for the Final Variables Used in the Path Analysis Testing HRQOL (VI)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Age	—	-.024	.037	.115	.067	-.360**	.494**	.250**	-.233**	.248**	-.173*	-.044	.448**	.212**	-.398**
2. Education Level		—	-.074	-.092	-.205**	.282**	-.285**	-.109	.393**	-.143	.498**	.468**	-.224**	-.454**	.400**
3. Number of Children			—	.000	.068	-.218**	.237**	.157*	-.299**	.234**	-.260**	-.322**	.248**	.242**	-.301**
4. Household Expenditure				—	-.049	-.161*	.145	.132	-.146	.173*	.037	.071	.230**	-.006	-.111
5. Social Support					—	-.202**	.092	.072	-.126	.063	-.078	-.066	.165*	-.039	-.034
6. ADL						—	-.623**	-.292**	.131	-.281**	.561**	.476**	-.742**	-.643**	.732**
7. Co-Morbidity							—	.352**	-.225**	.328**	-.476**	-.322**	.632**	.539**	-.647**
8. DI. Knowledge [a]								—	.088	.579**	-.238**	-.131	.407**	.336**	-.446**
9. SW. Knowledge [a]									—	-.040	.267**	.232**	-.061	-.138	.097
10. Attitudes										—	-.279**	-.120	.417**	.304**	-.386**
11. Selective Control											—	.847**	-.470**	-.688**	.695**
12. Compensatory Control												v	-.354**	-.623**	.584**
13. Overall Health Care Utilization													—	.637**	-.747**
14. Depressive Symptoms														—	-.893**
15. HRQOL															—

Note.
[a]: DI. Knowledge=disease-related knowledge; SW. Knowledge=social welfare related knowledge
*p<.05, **p<.01